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International Edition

73 Amateur Radio Today

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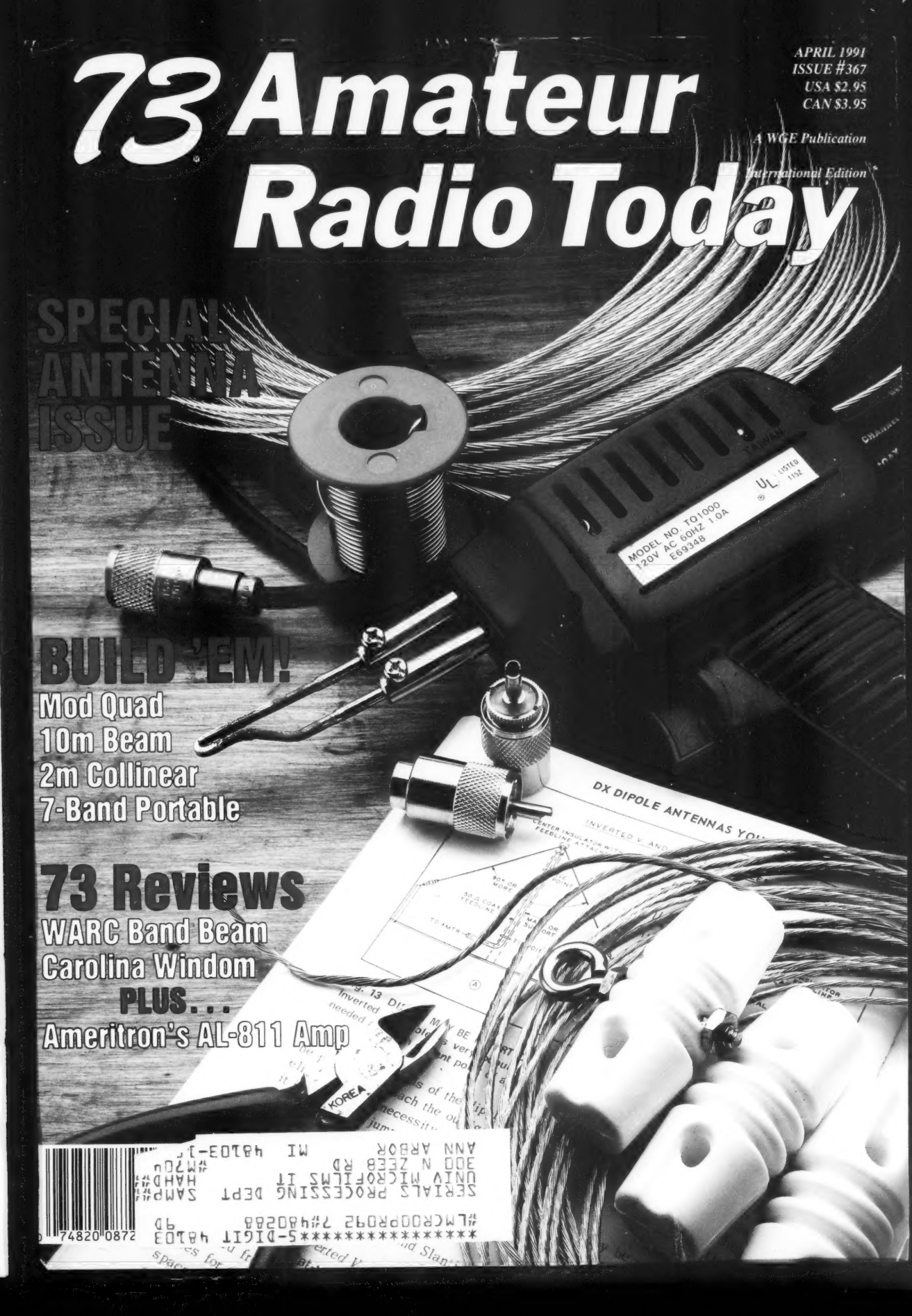

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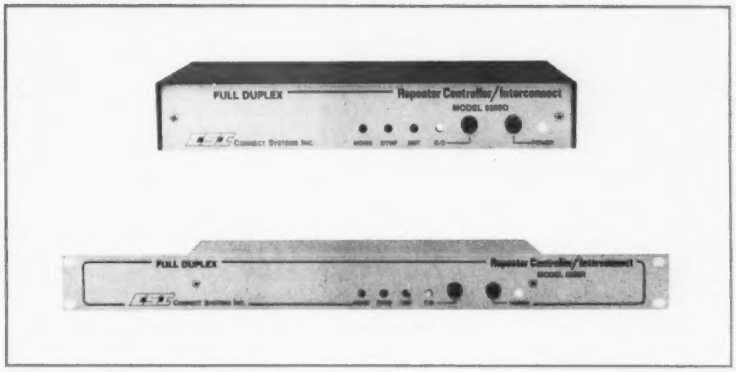

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CIRCLE 12 ON READER SERVICE CARD

LETTERS

From the Hamshack

Lyndon Taylor N6UCE, Yorba Linda CA As a person who does a considerable amount of reading on a variety of subjects, including amateur radio, and as one who finds himself frequently on the "opposite side" of most modern opinions of social, education, and political "truth," I want you to know how much I appreciate your columns in *73*. I say this not because you generally mirror my opinions, but because of the clarity of your presentations and your obvious conviction about what you are saying! Case in point: The December 1990 issue, where you discuss both the ARRL and the joys of being an entrepreneur. In about three paragraphs, you have presented an eloquent description of the motivation of the entrepreneur, the "adventure" of pressing an idea forward, not for money, but for the personal reward of seeing an idea that you have had become an operational reality. I can't think of anything more exciting than that, and you have stated this case beautifully.

73 Magazine is certainly more than a magazine about ham radio. It is a statement about life, about enthusiasm, and about the pursuit of excellence.

In the same issue there is an absolutely superb column by David Cassidy N1GPH on "magic." David captured the essence of why many of us entered into ham radio. It *is* magic when I walk out in my back yard and see a piece of wire stretched across the sky and know that a few hours ago it allowed me to talk to a research biologist in Antarctica over 8,000 miles away. Just as it was magic when, as an 8th grade student in the late '40s, I strung together some tubes and wire and ultimately produced a functioning television set.

The rest of your magazine is loaded with good articles about radio, and numerous ads about products and services of value to the amateur. Thank you again for your excellent writings and publications.

Art Oates, Jr., K9GBN, Pekin IL Read your article reviewing the Kenwood 27A. This radio, as you said in your article, looks nice; but that is as far as it goes. The radio has no selectivity on an outside antenna. Kenwood admitted twice to me on the phone that on an outside antenna selectivity is bad, and said that all handhelds are bad that way. I told them to use the ICOM micro or Heath micro because they don't pick up paging and weather bureau 20 miles away. It is the design in their radio which gives it bad selectivity. If you had read the schematic, you would have seen the problems they have with the selectivity.

Also, you didn't mention that it has a bad overheating problem. Could that be why, as yet, they haven't come out with a quick charge and 12 volt battery? My advice—don't operate the radio too long on 12 volts or you will have more problems with the 27A. Kenwood won't say when they will come out with a 12 volt battery or quick charger.

I didn't mention a problem with the TH-27A's selectivity because I didn't experience one. I have operated the radio in many urban areas, including the RF-saturated Northeast, and I have not found the selectivity any worse than that of other HTs. Current HTs, capable of receiving a much wider frequency range than older models, do exhibit worse selectivity than previous models (such as the old IC-2AT), but this is a problem shared by all HTs. To single a Kenwood HT out for this would be grossly unfair.

The same holds true for what you call a bad overheating problem. When you operate any modern HT at 5 W output for any length of time, you are going to get some serious heat! To imply that Kenwood's HTs are the only models to heat up at high power wouldn't be accurate. By the way, a quick charge is available. It is listed in the TH-27A instruction manual on page 48. Kenwood tells me that a 12 volt battery is to be released soon. . . . David N1GPH

Sandra M. Hawley N5OLU, Houston TX I resent both the snide tone of your "Flaplet" item in the February "Never Say Die," and your inflammatory misstatements about what happened at the Houston Ham Com.

First, the "mad" ARRL officials you referred to were members of the Clear Lake Amateur Radio Club. We were at the Ham Com because the organizers of the convention had asked us, for the third consecutive year, to run the ARRL booth for them.

Second, we weren't "steamed" because we had been refused free passes for the vendor area. In fact, we had badges that gave us access to the vendor area all day. The Ham Com officials gave us those badges, as they had in previous years, because the ARRL is classified as a "vendor" at the convention.

Third, our members did not "sneak into" the paid area and get caught "red-handed" by vigilant Ham Com officials. They put on the badges, said hello to the guards, as they had earlier, and walked in with official permission, as they had earlier.

Fourth, we did not "still refuse to buy tickets." We were never told that we should buy tickets at any point. The Ham Com officials simply marched up to the CLARC members and told them (us) point-blank to get out—this desipte the fact that CLARC was there at *their* request, wearing the badges that *they* had given us!

Furthermore, our members scarcely qualify as "bullies." One of the CLARC members who was treated so rudely was the 1990 AEA Amateur Ambassador of the Year—an individual who has made, and been recognized for making, major contributions to amateur radio. The other "sneaking bully" was a long-time amateur, elmer to many in the Houston area, and father of the winner of the 1988 Hiram Percy Maxim Award.

I have enjoyed my involvement in amateur radio, and I had enjoyed helping out at the ARRL booth. It seemed a good way to return at least some of the benefits amateur radio has given me. After this mess, I find it hard to keep up my enthusiasm for the Houston amateur radio scene at a high level. And I damned sure won't be volunteering to help at the Ham Com again.

Finally, I am appalled to find such slipshod reporting in your column. Like many others, I have often enjoyed your iconoclasm and even a bit of "ARRL-bashing." Now, having been at the other end of the bashing, I must wonder how many of your previous comments have been as inaccurate and injuring as those in the "Flaplet."

Ahh, the flaplet is being fanned into a full-sized flap! Sandra, my item came solely and totally from a report put on an ARRL BBS by the members you are defending, not the Ham Com people. Rashomon! . . . Wayne

Bob Minton NU7L, Boise ID Kudos for your stand on the problems in amateur radio. Let me add a thought or two concerning American manufacturers. I just canceled my dealership yesterday with one very well-known publisher because of their poor service. They turned down a thousand dollar order just because of their all-too-typical American snotty attitude about doing business. They are not the first company I have refused to do business with because of problems.

American manufacturers are curious as to why we have a 100 billion plus trade deficit each year. I can tell them, as I deal daily with overseas and domestic importers. Manufacturers from Hong Kong and Taiwan want my business and accommodate me as much as possible; American companies are too hung up on producing balls of red tape and nonsensical corporate idiosyncrasies for me to deal with. Until Americans get back to good old-fashioned customer service instead of dreaming up new ways to stop the flow of products, the U.S.A. is going to be nothing but a consumer country.

I hope some of the people in the electronics industry read this and take a hard look at their operation. Get rid of the placid, whiney sheep you have hired as employees and give us people who can converse intelligently over the phone. And for goodness sake, hire people who can make a decision on their own without having to check with everyone from the shipping clerk to the corporate washroom attendant.

Bob, when you're right, you're right! Every book you read on how to run a successful business stresses customer service. But getting this message through to employees can be almost impossible. We need a revolution in our whole American educational system. How are we going to teach youngsters who are given supermarket toys that break within minutes about quality? How are we going to teach Americans, who happily buy Detroit cars, to even understand the concept of quality? . . . Wayne

T.S. Rowinski KA1MDA I follow your editorials very closely, and for the most part agree with all of them. I feel, though, that you are missing one major contributing factor for the decline of the American consumer electronics industry: customer service/respect. It has been my experience that the Japanese companies treat me with respect and courtesy, regardless of how small the order. The American companies, on the other hand, give me the impression that I'm keeping someone away from their coffee break!

As an example: When my five-year-old IC-2AT HT broke down, I located the defective part and called ICOM. In no time, I was transferred to the engineering department. I described the location and function of the part, and the engineer found the part number and gave it to me. When I called the parts department, I was informed that it fell below ICOM's minimum order amount. The woman asked me if I was sure I didn't need anything else. When I replied no, I was informed that the part would be sent to me free of charge! Three days later, the part arrived, and my 2AT was back on the air that evening.

Now let's take a look at G.E. At a hamfest, I purchased a three-year-old shortwave radio manufactured by G.E. Six months later, the BFO pot went bad. I wrote G.E. a letter and received a reply four months later stating that G.E. did not sell parts to consumers, and if I wanted my radio fixed, I would have to send it in to their repair depot. I managed to find the G.E. HELP phone number, and they gave me the name and number of a parts depot. To make a long story short, the parts depot couldn't sell me a part unless I gave them the G.E. part number, and G.E. wouldn't give me the part number unless I bought the service manual! Final tally: To obtain a 50k ohm, linear taper pot, it took 7 months, 1 letter, 5 phone calls, and $32 for the manual! I'm still waiting for the part, though . . . it's on back order.

Whose products do you think I'll buy in the future? Sure, I wish I could "buy American," but I'm not going to pay premium prices for products from manufacturers who don't want to be bothered dealing with me ten minutes after my cash is in their pockets!

Jim Blizzard AB4YC Just finished reading your "Never Say Die" column in the February issue. In it, you state: "We need to do something to revive an interest in CW. . . . The voice bands are busy and the CW bands are oddly vacant." You then ask us to count the number of CW frequencies in use.

You write this shortly after you finish telling how harmful CW is to the human body. What gives? If you, yourself, are "going to steer well clear of Morse, both receiving and transmitting," why shouldn't we?

I enjoy CW quite a bit, but after reading your column, I have decided to hang up my keyer. I am sorry to read that CW may be dangerous to my health, but I thank you for being courageous enough to publish this information.

If hams heed the warnings about CW, it seems that the CW bands will become even more deserted. Keep up the good work . . . and see you in the voice bands.

You're right, of course. But keep in mind that I've been warning against cigarettes for over 30 years, and my editorials haven't had a noticeable effect on ham smoking.

If you're interested in knowing more about the enormous complexity of cells and the electromagnetics involved, you might look for Electromagnetic Man, *by Smith and Best (1989). It's miserably written, but the information, once it's picked out, will be most disturbing for hams.*

It's interesting, too, if you're into understanding how life works, to read Origins, *by Shapiro. I've just read both books and found them fascinating.*

So we have to deal with both the real world . . . plus strive for the more ideal world, where people avoid potentially destructive forces. . . . Wayne

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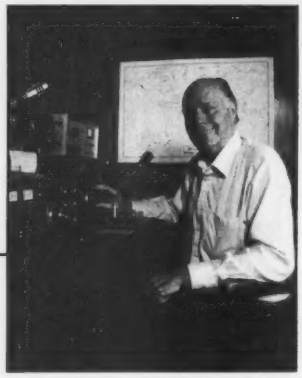

NEVER SAY DIE

Wayne Green W2NSD/1

First UPS, Now Apple!

You've probably read about Apple asking the FCC to set aside 40 MHz for a computer communications system. Well, I predicted in an editorial that such a network would inevitably have to be developed, so this isn't any big surprise. I'd hoped that we hams would be the developers, just as we pioneered today's cellular telephone system.

But just as technology had passed UPS by with their compandered SSB dreams, which we hams tried and found seriously wanting, I suspect that the Apple people who threw this one into the FCC's input basket didn't do their technological homework. Of course we hams shouldn't be ones to talk. We're still fussing over the code, which has been technologically dead for over 40 years. Alas, even with voice communications, in this great digital age we're still hanging tough with analog. It's sadly reminiscent of our "Spark Forever" stance in the late '20s and our resistance to SSB in the late '50s.

But it seems to me that a computer company should be able to come up with something better than a technology which requires 40 MHz for intercomputer communications. Tsk. Ain't you heard about spread spectrum, kiddos? Oh well, we hams haven't either. Not really.

Oh, I agree that with the world finally moving to laptop and notepad computers, having to plug wires into 'em doesn't make sense. They should be able to access networks, hard drives, data bases, large screen displays and printers without umbilical cords. And they will. They will.

Sure, we can assign separate channels for every computer at a site and do this the brute force way. It'll be easy to build in a tiny communications module which can interface with a repeaterette within a hundred feet or so. Then these repeaters can be linked via cable, telephone or even satellites to the world. . . as well as local support systems. Ooops, there's a message just in from Compuserve. . . and another via Prodigy. I can tell by the little blinking "C" and "P" on the bottom line of my notepad computer screen. Just a second. Oh yes, some chap in India says the band is open to my area and he wants me to get on 14.210 for a QSO. Yep, there he is. . . nice signal, too.

With spread spectrum we should be able to interlace zillions of computers, all in a much smaller frequency band than 40 MHz. Our communications will be infinitely more secure, too. And since any band they set aside for the Apple corps will probably eat into the nearest ham band, we have a strong vested interest in beating Apple and the FCC back with a technological stick.

No, I don't expect you, as an individual with no real interest in the frequencies we'll probably lose, to take the time to write to Apple or the FCC and express your concern. After all, it isn't your ox that's being gored. Nor do I expect that you'll bring this up at a club meeting and ask the club secretary to write to Apple and the FCC expressing a group concern. Nor would I expect anyone visiting an Apple dealer to say anything. Nor do I expect to see much mentioned about this in ham club newsletters. Nor do I expect to see the ARRL take a leadership position on this very small matter. Nor do I expect that my expectations, which are minimal, will be exceeded.

Yes, I rail out against this and that, but please do not convince yourself that I honestly expect to see any real changes. Oh, sure, I have hopes. But I'm used to changes coming slowly.

I started pushing for a no-code ticket in 1958, as I recall. At that rate of progress, I'm not likely to live to see another major change in amateur radio. I've already used up most of my allotted three score and ten and we're talking genuine glacial-speed changes. Despite my enthusiasm for new ideas, I do have one foot rooted in the real world, so, as I revealed above, my hopes are high and my expectations are low.

Will the League sue the FCC over the no-code ticket? Maybe they should start a new campaign to get donations to fund the League lawyers in these expensive attempts to further alienate the FCC. Oh, oh. . . there I go offending the delicate sensibilities of the true ARRL believers. Darn it, I wish I'd stop doing that. There's already talk of an anti-Green League jihad for blaspheming The Faith. Make a little more room in your cave, Rushdie.

Will no-code be as bad as many negative-thinkers are saying? Of course not! Will it be as great as starry-eyed optimists are preaching? Baloney! Will it start swelling our ranks and reversing our loss of newcomers? Well, I have good news! The word is just in: A chap in Albuquerque has come aboard as a no-code Tech. Gentlemen (and YLs too), we have a new licensee. I was going to say, "Rah!," but our new ham is Hispanic, so let's say, "Ole!"

As a gourmet chef I'm known as the Kitchen Cynic (call me KC for short), so I try to keep my gullibility on short tether. Even so, there are already some rays of hope that no-code will help. Like a late flash from Silicon Valley's W6NLG saying their new VEC session pulled 57 candidates, up 170%.

K1MAN Update

As if we haven't been having enough trouble with KV4FZ and his group making a mess out of the high end of 20m, now we've got K1MAN lousing up 14,275 with endless self-congratulatory broadcasts. The FCC has tried to shut him up with official citations and fines. Apparently K1MAN has substantial resources, so he's embarked on a plan to enrich both his and the FCC's legal teams, all to the detriment of amateur radio, in order to keep his microphone open.

I guess, as long as we only have Baxter and the ARRL sending blind transmissions on our bands, we can live with losing two channels. But what if there turns out to be more hams who want to broadcast?

I can understand W1AW's broadcasts. They're desperately pushing for more *QST* subscribers, so they need to advertise in every way they can (under the guise of public service, naturally). Having met and talked with Baxter, I can understand why he's broadcasting—and willing to spend whatever it takes to continue.

I hear he's pushing hard to take over the American WARC team next year. I've been trying to think over all of the hams I've met or talked with to see if I could come up with someone who I'd like less to see representing America at WARC. I've failed so far, but I'll keep thinking.

Now, I may come across in my editorials as opinionated. I like you to think that, even though I chuckle when I get letters complaining. If I let things really bother me the way I pretend, I'd have been dead years ago. With that in mind, I want to tell you about a phone conversation I had with Baxter. Well, "conversation" isn't quite accurate.

In my entire life I don't think I've hung up on more than two or three people—and the others were insurance salesmen. With Baxter I found myself faced with a close approximation of listening to his broadcasts. Nothing I could say or even shriek stopped him. I finally gave up. He almost made me mad.

With this background you may be able to imagine my reaction when I read in a ham newsletter that Baxter was bragging that he had sent a ham delegation to Baghdad to try and work out a peaceful solution between the U.S. and Iraq with Saddam. I thought, what kind of idiot have we got here?

Efforts to corroborate that this peace mission was anything more than a figment have not borne fruit. If it's true, then Baxter put several hams into terrible jeopardy. It's also, of course, completely illegal for private citizens to deal with foreign governments on behalf of the U.S. But Baxter was mixing in with U.S.–Soviet dealings, so who knows?

The War

It's nice that the FCC hasn't put us off the air during our last three wars. I still remember hearing about Pearl Harbor during a 160m QSO that long ago Sunday on December 7th. And I remember amateur radio being closed down the next day, with W1AW going after hams who pretended not to have heard about the ban. We were off the air for four years.

I'd been retired after five busy submarine war patrols and sent back to New London to teach electronics when the war ended. That same day I got on 2m, the first band they opened, from my school lab and made several contacts. I spent many nights on a hill in the submarine base with a little home-made transceiver, talking with local hams. It was a little long-lines 1G4GT/1Q5GT rig I'd built from an article in *Radio* in 1939.

After the Korean and Vietnam wars there wasn't a lot for us hams to do. But this new war is a little different, so I see an opportunity for us to provide a real and needed post-war service.

There are hundreds of thousands of people in the U.S. with friends and families in Iraq and they're going to be frantic to find out how things are at home. The military can't possibly cope with this level of health and welfare traffic. It'll probably be months to years before the telephones are working dependably again. That kinda leaves us, doesn't it?

We're going to need some volunteers to hit the decks running, so to speak. We're going to need several ham stations to be set up in Baghdad and the other major Iraqi cities to provide the communications which will be needed. If you are interested in spending a month or two on such a project I'll see what I can organize in the way of transportation.

Continued on page 86

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The new TS-950SD is the first Amateur Radio transceiver to utilize Digital Signal Processing (DSP), a high voltage final amplifier, dual fluorescent tube digital display and digital meter with a peak-hold function.

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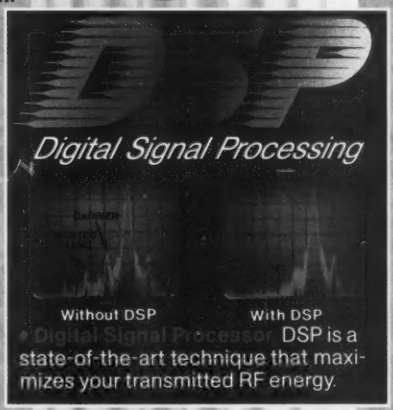
Complete service manuals are available for all Kenwood transceivers and most accessories.
Specifications, features and prices subject to change without notice or obligation.



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- SO-2 TCXO * • VS-2 Voice synthesizer
- YK-88C-1 500 Hz CW filter for 8.83 MHz IF *
- YG-455C-1 500 Hz CW filter for 455 kHz IF *
- YK-88CN-1 270 Hz CW filter for 8.83 MHz IF
- YG-455CN-1 250 Hz CW filter for 455 kHz IF *
- YK-88SN-1 1.8 kHz SSB filter for 8.83 MHz IF
- YG-455S-1 2.4 kHz SSB filter for 455 kHz IF *
- SP-950 External speaker w/AF filter
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* Built-in for the TS-950SD
† Optional for the TS-950S

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- **Balance control and separate squelch controls for each band.**
- **Full duplex operation.**
- **Dimmer switch.**
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- **Frequency (dial) lock.**

Optional Accessories:
• **PG-4H** Extra interface cable for IF-20 (for three to four radios) • **PG-4J** Extension cable kit for IF-20 DC and audio • **PS-430** Power supply • **TSU-6** CTCSS decode unit • **SWT-1** 2 m antenna tuner • **SWT-2** 70 cm antenna tuner • **SP-41** Compact mobile speaker • **SP-50B** Deluxe mobile speaker • **PG-2N** DC cable • **PG-3B** DC line noise filter • **MC-60A, MC-80, MC-85** Base station mics. • **MA-700** Dual band 2 m/70 cm mobile antenna (mount not supplied) • **MB-11** Mobile bracket • **MC-43S** UP/DWN hand mic. • **MC-48B** 16-key DTMF hand mic.

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QRX . . .

EDITED BY LINDA RENEAU KA1UKM

The End of Packet?

Last January, eight amateur packet operators were fined $300 each in Notices of Forfeiture, and three others received Notices of Violation of Part 97, according to the Norfolk, Virginia, FCC Engineer in Charge, J. Jerry Freeman. The offending message, dated January 5, 1991, stated: "From: wa3qns@n3la.pa.usa.na (JOE); Message ID: 21035–N3LA; TO: all@allbbs; SUBJECT: Call This Number, ASAP; VOTING BY PHONE - PHONE 1-900-44-NO WAR!; Conf: mideast gulf; Coalition to Stop U.S. Intervention in the Middle East (October 20 Coalition); 36 East 12th Street, 6th Floor, NY, NY 10003; Phone (212) 254–2295; Fax (212) 979–1583; December 7, 1990—The coalition has a national '900' phone number to tell Bush 'NO WAR.' The number is 1-900-44-NO WAR (starting Dec. 16). Please use it. A record of each call, by area code and region, will be taken with the petitions to Washington. You may contact the coalition for stickers and flyers to publicize this number, plus copies of the petition for a million signatures against the war, and other organizing literature."

The original complaint was registered by U.S. Navy officer Russell P. Tjepkemal/NZ2D of Virginia Beach, who said, "This message violates the spirit of amateur radio in that it has always been considered inappropriate to use amateur radio to further political causes." NZ2D also pointed out that the message did not mention the $10 fee for calling the 900 number. FCC rules prohibit the use of amateur radio to facilitate the business affairs of any party, whether for profit or not-for-profit.

According to AMSAT President Emeritus Tom Clark W3IWI, the citations ". . . may well spell the end to much of amateur packet radio." Clark was one of those cited by the FCC. Also among the cited were N4HOG, WBØTAX, WA4ONG, WA3ZNW, KA3CNT, WA3TSW, N3LA, and WA3QNS.

This appears to be the first time that the Commission has enforced the rules against operators of packet stations who retransmit an allegedly violative bulletin originating at another station. A debate has raged for years over whether operators of intermediate stations in a packet network should be held responsible for compliance of retransmitted messages.

Sysops and users of packet BBSs are confused or furious about what to do. Here are some typical statements seen on packet systems around the country: "I must now HOLD ALL TRAFFIC through this board until I have reviewed it for my own safety . . ." "This is a VERY BAD SIGN! If this is upheld, my BBS may have to be shut down, as I cannot review every message, or even every bulletin, that passes through it." "I want to make public . . . that this BBS . . . now screens all bulletins . . ."

W3IWI aired the most extensive response. He says, "The implications of the action by the FCC's Norfolk Field Office are absolutely appalling. What is implied is that . . . every station in a store-and-forward network is responsible for the actual message CONTENT passing through each node. The BBSs were cited because their calls were in the message header 'audit trail.' The FCC's action states that each BBS SYSOP is personally responsible for the 'correctness' of all messages merely passing through his system. Here, the W3IWI mail switch handles about 10,000 messages per month automatically. There is NO WAY I can vouch for every bit that passes through!"

Another consideration, says W3IWI, is PACSAT, ". . . a flying BBS with the sysops on the ground. To screen out 'offensive' messages, a ground-based sysop has to use a radio channel to verify message CONTENT. But the FCC letter says that the very act of reading an 'offensive' message on the radio is illegal . . . the logical implication is that PACSATs must be turned off!

"A number of us have discussed such issues with responsible individuals at the FCC in Washington ever since the first fledgling days of packet radio. The signal that the FCC sent was that the sole responsibility for the CONTENT of a message lay with the ORIGINATOR. The actions of the Norfolk Office seem to indicate a new policy has been adopted which effectively kills packet radio." *TNX* W5YI Report, Vol. 13, Issue #4.

Get Ready for STS-37!

The next SAREX (Shuttle Amateur Radio EXperiment) mission is currently scheduled to lift off on April 4 at 1420 UTC. Onboard the *Atlantis* will be the first all-ham crew: Ken Cameron KB5AWP, Jay Apt N5QWL, Linda Godwin N5RAX, Steve Nagel N5RAW and Jerry Ross N5SCW. They plan to operate on voice, packet, SSTV and ATV during the five-day mission. When the crew is busy with other duties, the packet robot (similar to STS-35) should be operational. Please note that it's only necessary to receive a QSO number from the robot to qualify as a valid contact. However, it's important to send in a copy of your contact for a QSL.

Photo A. The STS-37 crew insignia, designed by crew members. The shuttle and Gamma Ray Observatory (GRO) are connected by a large "gamma" symbolizing both the quest for gamma rays and the importance of the relationship between the manned and unmanned elements of the space program. Can you find the reference to our magazine's logo in the insignia?

The SSTV downlink should provide us with some spectacular views. Look for this mode during spacewalk activities, and in particular during the release of the Gamma Ray Observatory (GRO). During the scheduled school contacts, the astronauts plan to send down occasional SSTV pictures directly to the students.

Only a few stations, primarily at the NASA space centers, have been approved for the fast-scan ATV uplink experiment. If this is successful, it will be the first time any fast-scan video has been uplinked to any U.S. manned spacecraft.

An *Atlantis* to *Mir* contact is likely to be attempted. *Thanks to Roy Neal K6DUE, Bill Tynan W3XO, and Lou McFadin W5DID for the above information.*

FREQUENCIES TO BE USED FOR THE STS-37 SAREX MISSION

Mode:	Downlink Freq. (MHz)	Uplink Freq. (MHz)
Voice or SSTV:	145.55	144.95
		144.91 & 144.97 alternates
Packet:	145.51	144.91 MHz
		144.93 & 144.99 alternates

For SAREX updates during the mission, listen to the following transmissions:

WA3NAN (Goddard): 3.860, 7.165, 14.295, 21.395, 28.650, and 147.45 MHz.
W5RRR (Johnson Space Center): 3.850, 7.227, 14.280, 21.350, 28.495, and 146.64 MHz.
W6VIO (JPL): 14.270, 21.340, and 224.04 MHz.
K6MF (Bay area): 3.840, 7.165, and 145.58 MHz.

VE Improvements

The ARRL has made changes in its Volunteer Examiner Coordinator (VEC) program. The League will now permit its VE teams to retain up to $4.00 of the $5.25 exam fee in order to offset expenses in-

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curred locally. This should make it possible for VEs to schedule examinations more frequently and receive more publicity in their areas. The League will continue to provide its VE teams with the traditional services free of charge.

VEs may now telephone the ARRL VEC via a toll-free number: 1-800-9-ARRL-VEC (or 1-800-924-7583). Overseas VE teams should contact the ARRL VEC for information on how to access the number from their locations.

VEs who have been active in other VEC programs, and whose accreditation in another program is current, are now able to apply for "instant accreditation" as ARRL Volunteer Examiners.

By April 1, VE teams who prefer to use their own computers to generate exams will be able to do so. Also, teams preferring a multiple-choice format for Morse code exams will be permitted that option.

"As a result of the code-free Technician license, the demands on amateur radio Volunteer Examiners will be very heavy in the coming months," says ARRL Executive Vice President David Sumner K1ZZ. "We want to give our VEs the best support we can during this critical period. We also want to make sure that anyone seeking an opportunity to take an exam won't have far to look." *TNX ARRL. The above was excerpted from an MCI mail news release dated Feb. 13, 1991.*

Moonbase America

On April 16, 1991, 80 high school students will enter "Moonbase" next to Copley High School in Copley, Ohio, for a seven-day simulation. During that time, they will run their own government, eat food growing inside Moonbase, perform experiments, attend classes through a video link, and turn in their homework by FAX. All radio communication will be via amateur radio. Twenty students will be equipped with HTs, and the Communications Center in the Main Dome will house several amateur radio stations for OSCAR, packet, VHF/UHF, voice, ATV, and the low bands. Mission Control Center in the high school auditorium will be similarly equipped. Selected schools in each state will also participate in the simulation.

Special event certificates will be sent to stations contacting Moonbase from April 16 through April 22.

These students, from the Fairlawn Middle School and Copley High School, have been attending a state accredited space science class since last September. Part of their preparation included learning about amateur radio. Sixty-seven have obtained their Novice licenses, and with the new code-free Technician license, it's possible many more students will obtain licenses.

The Moonbase America project is funded by local and national corporation grants as well as local fund-raising. Training and technical support has been provided by the Cuyahoga Falls ARC, led by Rich Burgan WC8J, (216) 929-HAMS, and Mike Young WB8CXO, (216) 920-9976. For more information, you may contact Project Director Carolyn Staudt at (216) 666-5015. *Many thanks to WB8CXO for letting us know about this exciting activity.*

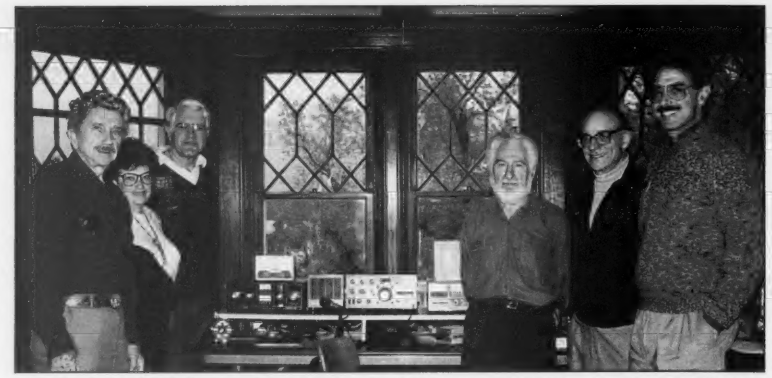

Photo B. The Committee for the Electronic and Radio Communication Center (ERCC) of the Science Museum of Long Island, left to right: Mike W2KO, Kate AE2Z, Sid K2LJH, Bill KA2OVR, Ed W2KPQ, and Alex AI2Q. Not present are Milt W2ERJ and Herman W2TLC.

Go for It!

During the devastating 1964 earthquake in Anchorage, Alaska, Barbara Carter helped her husband, K6RKG (a silent key) take messages. That's how she became interested in amateur radio. "I found it rewarding to assure families that their sons and daughters were OK." She got her Novice license in 1977; her Technician and General, in 1985; her Advanced, in 1987; and finally, her amateur Extra class license in 1988. "So many people helped me," she says. Some of these people were Dave W0MEY, Nels N6AQY, Mike W6FCQ, and members of the Marin Amateur Radio Club.

Barbara was a violinist in several symphony orchestras. For 14 years, she was director of a women's chorus. Once she sang with Arthur Fiedler in one of his San Francisco Pop Concerts. Today she enjoys doing ceramics.

Her message to potential hams is: "Go for it! Amateur radio is a fascinating hobby—meeting people around the world. Sometimes you make life-long friends . . . I would like to see more YLs enjoying the hobby as I do." *TNX Vicki Lee Hess W6OAE/T30CH, a ham for 35 years herself, and a friend of WB6TPN.*

Photo C. Extra class licensee Barbara Carter WB6TPN likes to work all the bands, but especially 15 and 20 meters. She enjoys both CW and phone.

New Teaching Center

A group of local radio amateurs have established a "New Age" Electronics and Radio Communication Center (ERCC) at the Science Museum of Long Island. The museum, a 22-room mansion on 40 acres overlooking Manhasset Bay, is a non-profit organization that offers staff development workshops, consulting services to educators, and hands-on training for teachers with limited science preparation.

The ERCC, now teaching Novice classes, will expand its program to hands-on training in radio communications, computers, satellite operation, packet, ATV, RTTY, and other developments.

The "Antique Radio and Electronic Section," ERCC's recent addition, are viewed by the many museum visitors. Names of the donors are attached to all items. If you wish to donate equipment, new or old, you can write the ERCC at: Science Museum of Long Island, Attention: ERCC, 1526 N. Plandome Road, Manhasset NY 11030.

Members from the Long Island QCWA, Chapter 81, spearheaded ERCC, with help from members of the LIMARC, Nassau, and Suffolk radio clubs. The Committee for the ERCC consists of: Ed W2KPQ, Mike W2KO, Sid K2LJH, Alex AI2Q, Kate AE2Z, Milt W2ERJ, Bill KA2OVR, and Herman W2TLC. See Photo B. You may contact any of the committee for additional information. *TNX Michael J. Orofino W2KO.*

Revolutionary NEW . . .
MFJ SWR Analyzer

MFJ's innovative new SWR Analyzer gives you a *complete* picture of your antenna SWR over an entire band — *without* a transmitter, SWR meter or *any* other equipment!

All you do is plug your antenna into the coax connector, set your SWR Analyzer to the frequency you want and read your SWR.

Setting up and trimming your antenna: Super simple and super accurate

You can instantly find your antenna's true resonant frequency right at your feedline -- that's something a noise bridge just can't do.

You can monitor SWR changes as you adjust your beam or vertical — you'll know right away which way to adjust it.

You can shorten or lengthen your dipole and see the effect immediately.

The MFJ SWR Analyzer is battery operated and handheld size so you can take it right to your antenna. It makes it sooooo easy to work on your antenna until it's just the way you want it.

Create your perfect multi-band antenna

You can instantly check multi-band dipoles and trap verticals to see if the low SWR points are where you want them and adjust your antenna until they're right.

Mobile Antennas made easy

You'll find the perfect adjustment for your mobile whip in seconds by actually seeing the SWR as you pull the whip in and out without transmitting

You can easily find the ideal place on the car for your mobile antenna by checking different spots with the SWR Analyzer.

All kinds of uses

You can see how the SWR varies over your entire band and quickly find your usable 2:1 SWR bandwidth.

You can see your SWR change as you drive under an overpass and see how mobile whip flutter affects SWR.

You can see what happens as you swing your beam toward the power line or away from your tower.

You can see how rain or snow affects your beam.

You can tune up your antenna tuner without transmitting.

You can check the SWR of the input to your linear amplifier.

You'll find all kinds of uses for this totally self-contained handheld unit that'll revolutionize how SWR is measured.

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The best way ever to measure SWR

Here's the best way ever to measure SWR . . . so get yours today!

MFJ VHF SWR Analyzer

MFJ-208

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If you operate 2 meters this new MFJ-208 VHF SWR Analyzer helps get your antennas in tip-top shape. Just plug in the coax to find the SWR of any antenna from 142-156 MHz. Use 9 volt battery (not included) or 110 VAC with MFJ-1312, $12.95.

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NEW

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With an adequate tuner will permit feeding any balanced transmission line this way.

Retains flexibility and efficiency of the ladder line feed without bringing the ladder line into the shack. One year unconditional guarantee.

DC-650 MHz Dummy Load

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One dummy load that covers 160 Meters through 650 MHz and QRP through 1500 watts!

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Artificial RF Ground

Maximize your antenna's efficiency.

by J. Frank Brumbaugh KB4ZGC

The ideal RF ground is having your station equipment mounted in and thoroughly grounded to a metal tub floating in salt water. Ham stations in boats approach this ideal, but the rest of us usually have to settle for considerably less efficient RF grounds. The many hams living in high-rise apartments and condos, even those with their stations on the ground floor of the typical house, have station ground leads many feet long between the equipment and actual ground. While this provides the DC ground necessary for safety, it is seldom an efficient RF ground on all the bands that you normally work.

For instance, many hams consider a few feet of wire or braid run to a nearby eight-foot ground stake a good solid ground. But—eight feet of wire is about a quarter wave on 10 meters, and presents a high impedance at the transceiver/transmitter chassis when the other end is connected to the ground stake or other good DC ground on 10 meters. This is not an RF ground at all, and the chassis will be "hot." If the mike tingles your lips, or if your fingers get "bit" by the setscrews in the knobs, you know you do not have a good RF ground, and you must do something about it.

Any length of wire or braid between your transmitter/transceiver chassis and actual earth ground presents an impedance which raises the chassis above ground for RF. Because ground connections are a part of your antenna system, impedance in the ground lead reduces the efficiency of your antenna system.

A Better Ground

To correct this problem, you can force a low impedance at the transmitter/transceiver chassis by shunting the station DC ground with a wire an electrical quarter wavelength long, open at the far end. Connect the other end to the transmitter/transceiver chassis, with the wire snaked on the floor along the shack wall. This quarter-wave "transformer" exhibits a very high impedance at its open end and reflects a very low—theoretically zero—impedance where it connects to the chassis. This provides a very good RF ground at the frequency at which the wire is a quarter wavelength in length. However, the RF impedance at the chassis, while low, will vary from one end of the band to the other, and is most effective only at the design frequency.

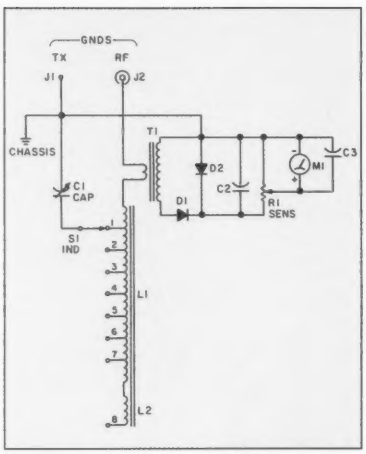

Figure 1. The artificial RF ground.

An eight-foot piece of wire connected to the chassis for an RF ground on 10 meters may be easy to hide, but what if you prefer to work 80 meters? Or even worse, if you like to work all the HF bands? You would need one or more quarter-wavelength wires for each band you normally use—and this can present problems. Few XYLs will tolerate a rat's nest of wires all over the floor, especially if the ham station is not located in a room by itself.

The Artificial RF Ground

This instrument is my solution to the problem of getting a low impedance RF ground on the bands I operate. My station consists of three monoband transceivers running 10 to 25 watts on the 10, 15 and 40 meter bands. It is located on the second floor of a frame house, in my bedroom. (Actually, my bed is in the shack!) My DC ground—a copper water pipe in the bathroom—is 34 feet from the station equipment, and an unknown number of feet from the bath to Mother Earth. I used to use open-ended quarter wavelength wires draped on the floor along the wall for RF grounds, but my cat insisted on dragging them all over the floor in a tangled mess. This made a different approach to RF grounding a virtual necessity.

Circuit Description

The Artificial RF Ground schematic is illustrated in Figure 1. A series circuit, consisting of C1, L1 and L2, is connected between the transmitter/transceiver chassis and a short length of wire which is open on the far end. The chassis, of course, is connected to your DC ground for safety reasons. This series circuit is capable of resonating in all bands between 40 and 10 meters, thus providing a low impedance ground for RF at the transceiver chassis. Current flowing in this series circuit is sampled between C1 and L1 by the primary of T1, and its level monitored on the meter M1. When the series circuit is tuned to resonance as indicated by a peak meter indication, the transmitter chassis is at ground potential for RF.

Theory of Operation

A series circuit consisting of capacity and inductance presents a very low impedance at its resonant frequency. When the transmitter is keyed (on CW, FM or AM) and the chassis is not at RF ground potential, a current will flow in the series circuit of C1, L1/L2 as determined by the position of S1 and C1, and when resonance at the transmitter frequency is achieved, this current will be at maximum. Switch S1 lets you insert varying amounts of inductance in series with C1, depending upon

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How the low cost 811A tube resists premature failure - even when your amplifier is mistuned

811A tubes resist premature failure in two ways.

First, they're constructed with widely spaced elements that minimize the chance of elements touching and causing a short — even if the plate gets hot enough to melt.

Second, they use a directly heated thoriated tungsten filament cathode that prevents the electron emitting layer from instantly stripping off — even if mistuning causes a sudden, severe current overload.

Indirectly heated oxide cathode tubes (like the $400 3CX800A7) can be rendered instantly useless if their electron emitting layer is stripped off because of a severe current overload due to mistuning.

The Ameritron AL-811 is excellent for the newcomer because it's tough enough to withstand momentary mistuning. And the tubes are so inexpensive that you can replace one for mere pocket change.

The Ameritron advantage: extra heavy duty power supply that gives you peak performance year after year

The heart of the AL-811 power supply is its heavy duty power transformer with a high silicone steel core weighing a hefty 17 pounds.

A full wave bridge using 52.5 ufd of total capacitance (four 210 ufd, 470 volt capacitors) produces 1500 volts under full load and 1700 volts no load. That's excellent high voltage regulation!

Full height computer grade filter capacitors with screw terminals are used — not short stubby, light duty soldered-in "high technology" capacitors that can't dissipate the heat generated by high current.

The rectifier diodes are rated for a massive surge current of 200 amps. They won't blow even if you accidentally short the high voltage supply.

Wire wound, 7 watt, 50 K ohm equalizing resistors safely protect each filter capacitor — not 2 watt, 100 K ohm carbon composition resistors that can open and cause your filter capacitors to explode or fail.

The Ameritron AL-811 power supply is built tough so you get peak performance year after year.

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The result is peak performance over each band, wide impedance matching range and exceptionally smooth tuning with efficiencies close to 70%. Even a 3:1 SWR load won't damage the tubes or tank components.

A ball bearing vernier reduction drive makes plate tuning precise and easy.

Quiet pressurized ventilation keeps your tubes safely cooled

A quiet fan pressurizes the cabinet with over 20 cubic feet per minute of cool air.

This large volume of air flow keeps the 811A tube temperature safely below the tube manufacturer's rating — even with a key down carrier at 500 watts output.

Two illuminated meters

Two illuminated meters give you a clear picture of your AL-811 operating conditions so you can tell right away if something is wrong.

The Grid Current meter continuously checks for improper loading. The other meter switches between high voltage and plate current to warn of abnormal conditions.

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the frequency in use.

The primary of T1, a step-up transformer, is connected between C1 and L1 where the highest current is available. RF current flowing in the series circuit can be sampled, stepped up in the secondary of T1, then detected by voltage doubler diodes D1 and D2, filtered by C2, and applied to the sensitivity potentiometer, R1. The DC voltage across R1 is directed to meter M1, which is bypassed by C3 to eliminate any RF from the meter. M1 will show a peak indication when the series circuit is tuned to resonance at the transmitter frequency.

At this point the transmitter chassis is at ground potential for RF. To ensure the best possible ground, use the shortest possible piece of braid or wire to connect J1 to the transmitter chassis.

Because a series circuit presents an extremely low impedance at resonance, this combination of C1 and L1/L2 and the length of wire which is connected to J2 forms a very low impedance RF ground which is electrically an odd multiple of a quarter wavelength at the operating frequency.

Parts List

C1	365 pF variable capacitor, broadcast radio type
C2, C3	0.01 or 0.02 µF disc capacitor
D1, D2	1N914, 1N4148 or equivalent silicon diode
J1, J2	Banana, pin, RCA jack, etc. (J2 is insulated from chassis.)
L1	36 turns No. 26 AWG e.c. wire on T68-2; tapped at 4, 8, 12, 16, 20, 24 and 28 turns from T1 end
L2	13 turns No. 22 AWG e.c. wire on T68-3 core
M1	100 to 200 µA DC meter
R1	10k linear potentiometer
S1	Wafer switch, 1 pole, 8 positions
T1	36 turns No. 26 AWG e.c. wire on T68-2 core; primary 1 to 3 turns insulated hookup wire

Suppliers

Amidon Associates, P.O. Box 956, Torrance CA 90508. (213) 763–5770. (Toroids.)

Fair Radio Sales, 1016 E. Eureka, Box 1105, Lima OH 45802. (419) 227–6573. (365 pF variable capacitor.)

Radiokit, P.O. Box 973, Pelham NH 03076. (603) 437–2722. (Toroids and 365 pF variable capacitor.)

Construction

This instrument should be constructed in a metal cabinet or box such as the Radio Shack 276-238, which measures 5½" x 3" x 2⅛". Tuning capacitor C1 is a standard broadcast radio capacitor with a maximum capacity of approximately 365 pF. If you don't have one in your junk box, they are available from Fair Radio Sales (P.O. Box 1105, Lima OH 45802) and other mail order dealers. Plate spacing is not a problem because of the high current/low voltage characteristics of a series circuit. Toroids for L1, L2 and T1 are available from Amidon Associates (12033 Otsego St., North Hollywood CA 91607) and other mail order dealers. Meter M1 can be any of the small surplus tuning meters with a full scale reading of 100 or 200 µA.

Most of the parts for this invaluable addition to your operating position can be found in your junk box with a little help from flea markets or other hams. I had to buy the aluminum box from Radio Shack ($2.49), but all the rest of the parts came from my junk box. Even if you have to buy all new (surplus) parts, the total cost should not exceed $10. This is a cheap price to pay for knowing your station is properly grounded for RF as well as DC, and your antenna installation is operating at peak efficiency.

Operation

Connect the shortest possible length of braid (preferred) or wire from J1 to the ground post on your transmitter/transceiver chassis. This chassis must, of course, also be connected to your station DC ground. Then attach a wire 10 or 12 feet long to J2, leaving the far end open. Be sure to tape up the open end of this wire so no one, including children or pets, can touch the bare end while your station is on the air. There will be a high RF voltage present at this end of the wire when transmitting. Dress this wire on the floor along the wall behind your operating position, or under the carpet if you have a fancy shack.

Tune up your rig on any chosen band. Then, with a constant carrier output—5 to 20 watts output will be sufficient—tune C1 (CAP) and S1 (IND) for a peak indication on meter M1. There may be more than one position of S1 which works. Choose the position that provides the highest peak meter indication. Use the sensitivity potentiometer R1 to keep the needle on the meter scale.

Each amateur radio installation is unique. No two are exactly alike. At my station, position 8 of S1 is used to tune 30 and 40 meters. The higher bands use various taps selected by S1, providing less inductance. If you find that you have a meter indication on 10 meters, but it will not peak at minimum positions of S1 and C1, shorten the wire connected to J2. If the same thing occurs on 40 meters at position 8 and maximum position of C1, lengthen the wire connected to J2. If you wish to operate 80/75 meters, either add a much longer wire to J2, or ignore the problem. This instrument is designed to provide an excellent, low impedance RF ground on those frequency bands where such a ground is most important—40 through 10 meters. Most ham stations operating on 80/75 meters already have a good RF ground because of the long wavelength and the relatively short DC ground lead to earth.

When you achieve a peak indication on the meter, the cabinet of the Artificial RF Ground is at ground potential for RF. If the length of braid or wire between J1 and your transmitter chassis is short, it too is at RF ground potential. Thus, you will have an excellent RF ground.

On some frequencies you may find that you can get a very low indication, or nothing, on the meter. If this occurs—congratulations! You already have an excellent RF ground on that frequency.

Caution

Although J1 and the chassis of the Artificial RF Ground are both at DC ground and connected directly to your transmitter chassis, it may sometimes be above ground for RF, especially while tuning for a peak on the meter. Touching the metal cabinet of this instrument may cause errors in meter indications. There is no danger involved but, by touching the metal cabinet, you are effectively placing your body in parallel with the series circuit, detuning it, and preventing a proper indication of resonance on the meter.

It's Worth the Work

Use of the Artificial RF Ground does more than please your rig. It will also eliminate any television interference that is not a result of harmonics or stray rectification. This will also please XYLs and close neighbors, a matter of importance to many hams, especially those in apartments or condominiums. Before I designed and installed this instrument, and operating at 10 watts PEP, my signals eliminated video and distorted the audio on several television sets in the house, as well as in a few surrounding houses, even though my rigs are clean and all the connections are solid in the antenna system. When installed and tuned to resonance, the Artificial RF Ground totally eliminated all TVI (we are served by a Cable system here), even on a 12-year-old color set sitting in the shack beside the rigs. Although fundamental overload may still be a problem for high power ham installations, using the Artificial RF Ground should eliminate all other sources of TVI, especially in Cable TV installations. 73

You may contact J. Frank Brumbaugh KB4ZGC at 82 Liddell St., Buffalo NY 14212-1824.

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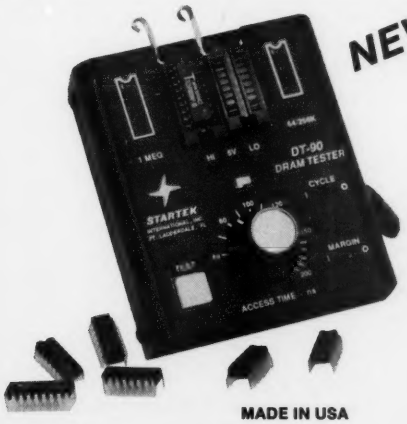

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The ESV Mod Quad

Inexpensive performer for any band from 50 through 1296 MHz.

by Martin Beck WBØESV

Because the idea of once again working DX on 6 meters appealed to me, I began searching for a method of building a really good antenna system. I prefer the quad, but in the past that ended up being expensive. This time, I decided I'd see what I could do using my favorite material: Acrylite™, a tough, clear plastic formulated for use with a chemical known as I.P.S. Weld-on #4.

The Mod Quad has some particularly desirable features. There is absolutely no metal employed in the spider assembly to skew the pattern. Even the boom is nonmetallic. The only tools you need to construct this quad are a measuring tape, a drill, and a saw. Once the materials are assembled, each quad element can be put together in one hour. No special skills are required, making this antenna an easy project for anyone. It's the least expensive antenna to build that I have seen to date.

Plastic Welding

In the plastic industry, the term "welding" means something entirely different from what it means in regard to working with metals. To illustrate: Let's say we place two clean, dry pieces of Acrylite together, and apply a couple of drops of Weld-on #4 at the edges of the junction. What happens? The chemical literally flows into the joint through capillary action. Once inside, it dissolves both surfaces, and the surfaces merge, becoming one. This is not a glued joint; the two pieces of Acrylite are now as much a single piece as if they had been originally cast that way.

Allowed to set overnight, the joint has twice the strength of one of the original two pieces.

The Spider Support

Make the spider supports by cutting out 10″ by 10″ squares of ½ inch thick Acrylite sheet (see Figure 2 and Table 1). If the ½ inch material is too expensive or unavailable in your area, just glue two squares of ¼ inch sheet together. For 6m and 2m, I like to glue enough squares together to make a 1 inch thick support (you can get away with ½ inch thick material as long as you beef up the corners to 1 inch, as shown in Figure 2). For 220 MHz and above, the ½ inch thick plate will work just fine, although it's best to trim it down to a 3″ by 3″ square (again, the corners need to be padded up to 1 inch, as in Figure 2).

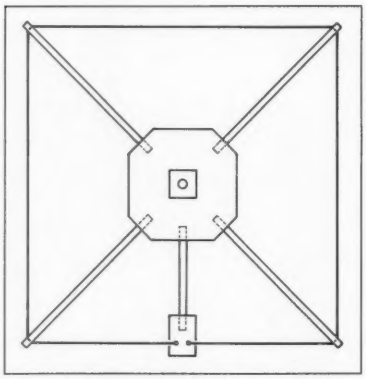

Figure 1. The ESV Mod Quad driven element.

Drill ½ inch holes into the edge of the support plate at the places marked 'G' on Figure 2. Insert a spreader arm (½ inch O.D. tubing or rod) into these holes and weld it (see Figure 1). Repeat this three times, and you have the ultimate quad spider—no metal, no mess. And it only takes a few minutes. Piece 'B' is used to beef up the main support plate 'A' where the boom joint is made. It's optional for 220 MHz and above. First drill four 1/16″ holes in piece B (don't drill through the 'A' plate) to facilitate getting the welding chemical through to the 'A-B' surfaces. Glue piece 'B' onto the main square (6m and 2m quads). After everything is dry, drill a 1″ hole in the center of the assembly to mount onto the boom (½ inch boom material can be used for 420 MHz and higher). Note that the arm labelled 'D' and the plate labelled 'C' are used on the driven element to support the coax attachment point.

The spider's center plate is joined to the 1″ diameter Acrylite rod (the boom) by the same welding technique as above (see Figure 4). The boom should be carefully marked (I use a piece of masking tape) for element positioning and spacing, because once you've welded it—that's it!

Figures 1 and 5 include feedpoint construction, but of course, that is not needed for the reflector and directors. Also, you can have more than four elements by merely joining more 1″ Acrylite joints, as shown in Figure 3, for a longer boom. The 0.2λ spacing can

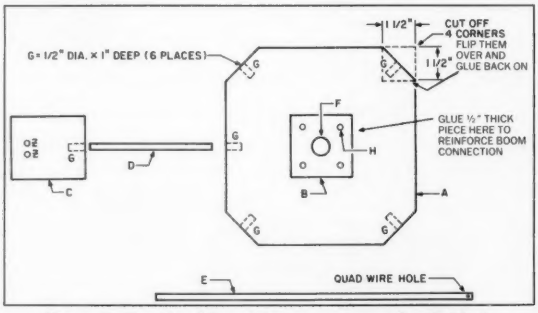

Figure 2. Details of the spider support arm. See Table 1.

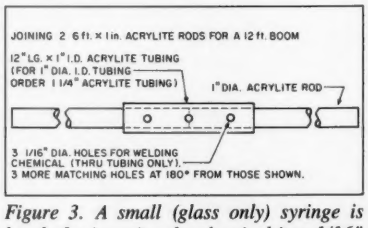
JOINING 2 6 ft. x 1 in. ACRYLITE RODS FOR A 12 ft. BOOM
12" LG. x 1" I.D. ACRYLITE TUBING (FOR 1" DIA. I.D. TUBING ORDER 1 1/4" ACRYLITE TUBING)
1" DIA. ACRYLITE ROD
3 1/16" DIA. HOLES FOR WELDING CHEMICAL (THRU TUBING ONLY). 3 MORE MATCHING HOLES AT 180° FROM THOSE SHOWN.

Figure 3. A small (glass only) syringe is handy for inserting the chemical into 1/16″ holes. If you use a glass eyedropper, don't get the chemical in the bulb—it's plastic-based! Two to four drops per hole is ample. Allow 20 minutes set-time, then turn the assembly over and put the chemical in the three holes on the opposite side. Again, wait 20 minutes before disturbing the joint. Let it set overnight.

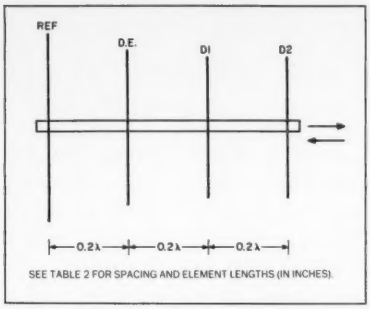

Figure 4. See Table 2 for spacing and element lengths in inches.

Table 1. The ESV Mod Quad Dimensions for 6m

Refer to Figure 2.

A	10″ x 10″ x 1″ Acrylite sheet
B	4″ x 4″ x 1″ Acrylite sheet. Drill four 1/16″ holes for entry of Weld-on #4.
C	4″ x 4″ x 1″ Acrylite sheet. Drill two holes for 6-32 bolts for feedpoint.
D	½″ dia. x 22″L Acrylite rod or tube
E	½″ dia. x 40″L Acrylite rod or tube. Cut four for spider arms.
F	1″ hole through A and B for 1″ Acrylite rod boom.

Note: Weld A and B together before drilling 1″ boom hole.

G	1″ deep x ½″ dia. holes
H	1/16″ holes
Z	Holes for feedpoint.

Note: The quad loop wire attachment hole on the spreader arm 'E' can be calculated from the following formula:

$$E\ (\text{inches}) = \sqrt{(\text{Element Length}/4)^2/2}.$$ *(See Table 2 for Element Lengths).*

This distance is measured from the center of the boom. Make the length of your spreader arms an inch or so longer than this measurement.

also be used with a small two or three element antenna.

What do you do if by some weird circumstance you have a broken spider arm? Simple: Cut it off at the plate edge, redrill the hole, and weld in a new one! If you were to get two elements welded onto the boom with incorrect spacing, you could simply saw the boom in half between the elements, slip the sawed ends into a piece of 1″ I.D. Acrylite tube, adjust the spacing—and, yes—weld the new joints in place. You can also use this method to increase the boom length beyond 6 feet (see Figure 3).

Acrylite is not expensive. Even with that latter term being relative, I feel the money is well within most hams' pocketbooks. And it's a strong material. Last year, a 116 mph wind storm broke all of my metal antennas, but not the Mod Quad. A friend reminded me of the Oriental tale of the resilient bamboo shoot that bent in the storm and sprang back, while the mighty but rigid oak was snapped. When buffeted by the wind, the Mod Quad does display a small amount of springiness.

Performance

The Mod Quad's gain is around 10 dBd. Properly spaced, a box of four quads makes a very potent system with a clean pattern. Since this quad is lightweight, it could be an outstanding antenna for Field Day. A simple TV rotor handles it easily.

While the spacing of 0.2λ gives excellent performance, you can play around with other spacings and possibly squeeze out a bit more gain. However, if you use the 0.2λ spacing, I have done all the element length and spacing for you. Refer to Table 2. The SWR is below 1.2:1 across 1 MHz, so this table is merely for the perfectionist. Most of the popular frequencies are listed. Many deadly serious DXers use 6 meters as their liaison band, but to avoid QRM, they stay higher up in the band. I computed the elements' sizes for that area as well.

Table 2. ESV Mod Quad and Delta Beam Element Lengths and Spacings

MHz	Sp.″	Ref.″	D.E.″	D1″, D2″
50.1	47.00	246.70	240.70	233.50
51.0	46.30	242.30	236.40	229.40
53.5	44.00	231.00	225.40	218.70
144.2	16.38	85.71	83.63	81.13
144.5	16.34	85.54	83.46	80.97
146.0	16.18	84.66	82.60	80.14
147.0	16.07	84.08	82.04	79.59
221.5	10.66	55.80	54.45	52.82
223.0	10.59	55.43	54.08	52.47
432.1	5.47	28.60	27.91	27.08
440.0	5.37	28.09	27.41	26.59
449.0	5.26	27.53	26.86	26.06
903.2	2.62	13.68	13.35	12.95
910.0	2.60	13.58	13.25	12.86
915.0	2.58	13.51	13.18	12.79
925.0	2.55	13.36	13.04	12.65
1250.0	1.89	9.89	9.65	9.36
1296.0	1.82	9.54	9.31	9.03

Note 1: Element spacing (Sp″) = 0.2λ
Note 2: Element Length Formulas:
Reflector Length (Ft.) = 1030/F (MHz)
Driven Element (Ft.) = 1005/F (MHz)
Directors (Ft.) = 975/F (MHz)

What You'll Need

With the figures and tables, construction should be a breeze. Acrylite can be obtained from your local plastics store. Call Cyro Industries at (800) 223-2976 for a distributor near you. You may be able to find enough scrap material at one of these stores to complete the whole quad. If you can't find a local outlet, you can mail order materials from Lustercraft Plastics, Inc., PO Box 17367, Wichita KS 67217. When you write, be specific about items and sizes, and be sure to enclose an SASE. The manager requests that all orders be accompanied by a money order or cashier's check.

You can buy a four-ounce can of the chemical for a little over $2. That's enough for four Mod Quads, since only a small amount is used per joint. Full instructions are printed on the can. You can apply it with a toothpick, glass syringe, eyedropper, or even a small artist's brush.

The only materials you need for the 6m Mod Quad are five 6-foot joints (standard length) of ½″ diameter Acrylite tubing or rod, a 6 foot length of 1″ diamater tubing or rod (6m and 2m) for the boom (a ½ inch diameter boom can be used for 220 MHz and above), and as many 10″ x 10″ x 1″ (or ½″) thick plates as desired.

This methodology is inexpensive, fast, and very easy to follow. It produces a lightweight antenna of superior design, strength, and gain. While the system shown here is geared to 6 meters, it is even better as we use it on 144, 220, and 432 MHz; for the higher you go, the lower the cost. 73

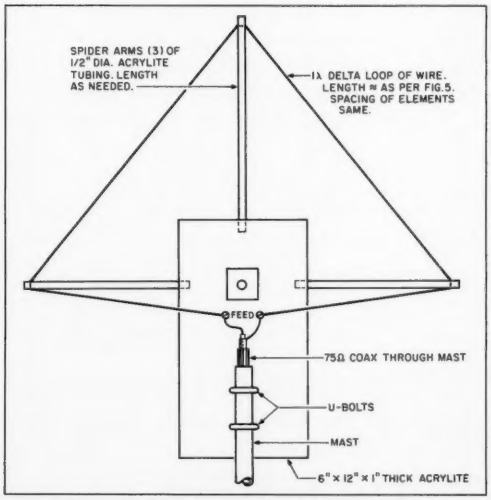
SPIDER ARMS (3) OF 1/2" DIA. ACRYLITE TUBING. LENGTH AS NEEDED.
1λ DELTA LOOP OF WIRE. LENGTH ≈ AS PER FIG.5. SPACING OF ELEMENTS SAME.
FEED
75Ω COAX THROUGH MAST
U-BOLTS
MAST
6" x 12" x 1" THICK ACRYLITE

Figure 5. Modifications for delta loop beam.

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The AEA PK-232 multi-mode data controller remains the most widely used radio data controller in the world. More hams own the PK-232 than *any other* radio data controller, and AEA's hard-earned reputation for quality and service keeps them coming back. The '232 gained its popularity with features like these:

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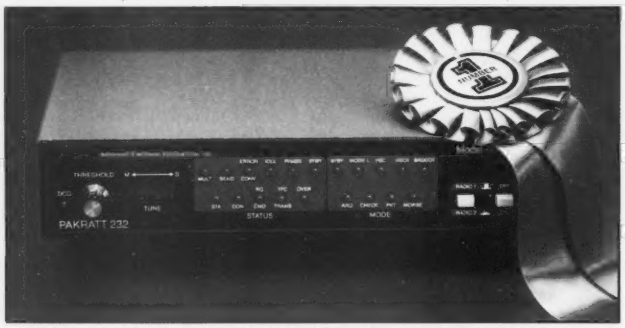
Since its introduction in 1986, the PK-232 has been updated **six times** to continue bringing you the breakthroughs. Six updates in four years! And even the very first PK-232 is upgradable to the latest model, with a relatively inexpensive user-installed kit.
If you want a state-of-the-art multi-mode controller, you want the PK-232 MBX.

SUPERIOR FILTERING

The 8-pole Chebyshev filter in the PK-232 was designed from the ground up to work on HF **and** VHF. We didn't just add some firmware to a Packet modem to create our multi-mode. Our modem was **proven** superior by tests in Packet Radio Magazine over *all the others tested.* Read the fine print! You just can't beat the PK-232 for performance, quality and integrity. 45,000 PK-232 owners can't be wrong!

INNOVATION

The PK-232 has been the one to follow for technology advances. It was the *first* radio data controller with weather-fax, the *first* with Host mode, the *first* with NAVTEX, the *first* with Signal Identification, the *first* with TDM, the *first* with AMTOR v.625, the *first* with a WHYNOT command, etc, etc. AEA has always strived to "Bring You The Breakthrough," and while others have tried to imitate, only one can be the best.



The only data controller **designed from the ground up** to be a true multi-mode, the PK-232's tuning and status indicators work in all modes, not just packet. Make sure the multi-mode you buy isn't just a converted Packet TNC. There's only one number 1!

HOST MODE

Many superior programs have been written specifically for the PK-232 in Host mode language: NEW PC-Pakratt II for IBMs and compatibles, updated MacRATT for Apple MacIntosh, and Com-Pakratt or Commodore C-64 and C-128 computers.

ALL DIGITAL OPERATING MODES

The PK-232 MBX includes all authorized amateur digital modes available today...Packet, Baudot, ASCII, AMTOR/SITOR (including the new 625 recommendation) and Morse code, as well as WEFAX (receive and transmit). Other features include the PakMail 18K byte maildrop system with automatic normal and reverse forwarding, NAVTEX/AMTEX reception, KISS protocol support, binary file transfer and more. Also included is the TDM (Time Division Multiplex) mode for SWLing that few others have. No other multi-mode has all these features.

SIGNAL ANALYSIS

The first multi-mode to offer SIAM (Signal Identification and Acquisition Mode) was, of course, the PK-232MBX. Indispensible to SWLers, SIAM automatically identifies Baudot, ASCII, AMTOR/SITOR (ARQ and FEC) and TDM signals, then measures baud rate and polarity. Once the PK-232MBX is "locked on" to the signal, a simple "OK" command switches to the recognized mode and starts the data display. You're even ready to transmit in that mode if applicable.
The PK-232MBX makes SWLing easy and fun, not difficult and frustrating.

REPUTATION

The PK-232MBX has helped AEA establish its hard-earned reputation for producing high quality amateur radio products. Anyone can **say** they have a good reputation, so it pays to ask around. Listen on the HF bands and see which multi-mode is getting *used*. You owe it to yourself to get the best possible value for your money. Don't settle for less!

Watch for the DSP-1232 and 2232 coming soon!

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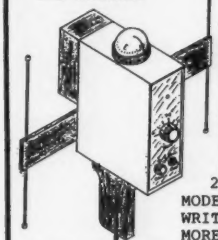

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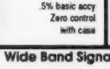

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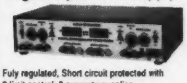

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1000 Channels. 8-600MHz, 805-1300MHz

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- Antenna attenuator switch, 10db.
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- Permanent memory backup.
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- AC adaptor/charger.
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- Belt Clip.
- Earphone.

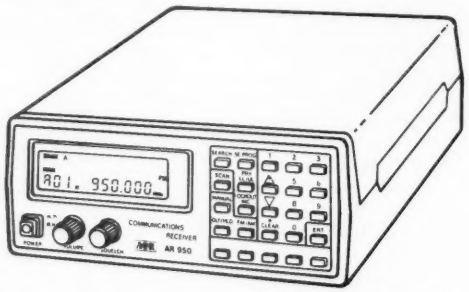
Options:

External Speaker. Mobile Mount.	MS190	$19.50
Extended Warranty. 2/3 yrs		$45/$55

Specifications:

Coverage:	8-600, 805,1300MHz
Sensitivity:	.35uV NFM, 1.0uV WFM, 1.0AM
Speed:	20 ch/sec. scan. 40 ch/sec. search
IF:	561.225, 58.075, 455KHz or 10.7MHz
Increments:	5 to 955KHz selectable/ 5 or 12.5 steps.
Audio:	.4 Watts
Power:	Input 9 - 13.8 V. DC
Antenna:	BNC
Display:	LCD
Dimensions:	6 7/8H x 1 3/4D x 2 1/2W. 12oz wt.

AR950 $239



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Specifications:

Coverage:	27-54, 108-174, 406-512, 830-950MHz
Sensitivity:	.4uV Lo,Hi. .8uV Air. .5uV UHF. 1.0uV 800
Scan Speed:	15 ch/sec.
IF:	21.4MHz, 455KHz
Increments:	10,12.5,25,30
Audio:	1W
Power:	12.8VDC, 200MA
Antenna:	BNC
Display:	LCD w/backlight
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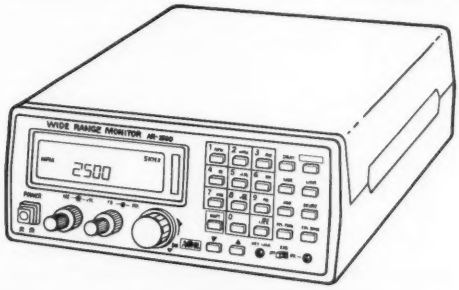


2016 Channels. 1 MHz to 1500 MHz

Standard Features

- Continuous coverage
- AM, FM, wide band FM, & BFO for SSB, CW.
- 64 Scan Banks.
- 16 Search Banks.
- RS232 port built in.
- Includes AC/DC pwr crd. Antenna, Mntng Brckt.
- One Year Limited Warranty.

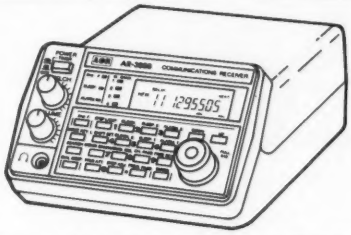
Options:

Earphone.	EP200	$2.00
External Speaker. Mobile Mount.	MS190	$19.50
Extended Warranty. 2/3 yrs.		$65/75
Mobile Mounting Bracket.	MM1	$14.90
RS232 Control Package (software & cable) offers spectrum display and database.	SCS2	$295.00

Specifications:

Coverage:	1 MHz - 1500MHz
Sensitivity:	.35uV NFM, 1.0uV WFM, 1.0AM/SSB/CW
Speed:	38 ch/sec. scan. 38 ch/sec. search
IF:	750.00, 45.0275, 5.5MHz 455KHz
Increments:	5,12,5,25 KHz
Audio:	1.2 Watts at 4 ohms
Power:	Input 13.8 V. DC 300mA
Antenna:	BNC
Display:	LCD, backlighted.
Dimensions:	2 1/4H x 5 5/8W x 6 1/2D Wt. 1lb.

AR3000 $995



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- AM, FM, wide band FM, LSB, USB, CW modes.
- Backlighted LCD display.
- 4 Scan and Search Banks, Lockout in Search.
- 4 Priority Channels.
- RS232 control through DB25 connector.
- Delay, Hold Features.
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- Sleep and Alarm Features.
- AC adaptor/charger. DC power cord.
- Telescopic Antenna.

Options:

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Mobile Mounting Bracket.	MM1	$14.90
RS232 Control Package (software & cable) offers spectrum display and database.	SCS3	$295.00

Specifications:

Coverage:	100KHz - 2036MHz
Sensitivity:	.35uV NFM, 1.0uV WFM, 1.0AM/SSB/CW
Speed:	20 ch/sec. scan. 20ch/sec. search
IF:	736.23, (352.23) (198.63) 45.0275, 455KHz
Increments:	50Hz and greater
Selectivity:	2.4Khz/-6db (SSB) 12KHz/-6db (NFM/AM)
Audio:	1.2 Watts at 4 ohms
Power:	Input 13.8 V. DC 500mA
Antenna:	BNC
Display:	LCD
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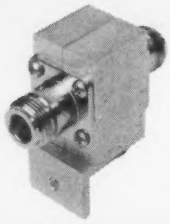

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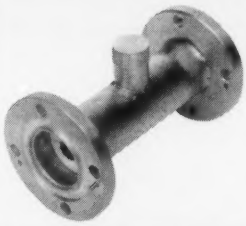

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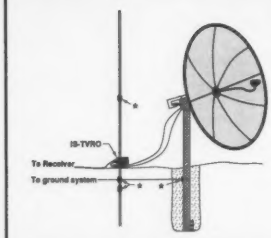

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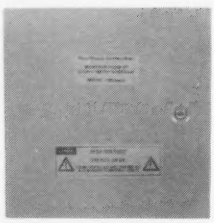

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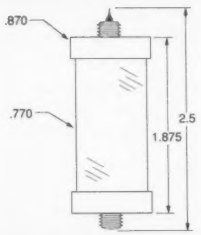

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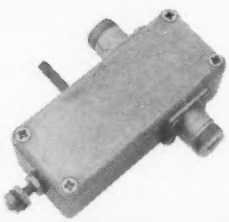

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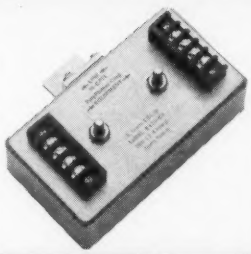

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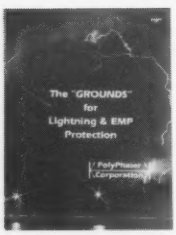

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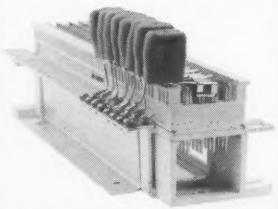

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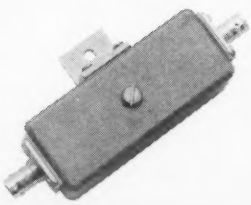

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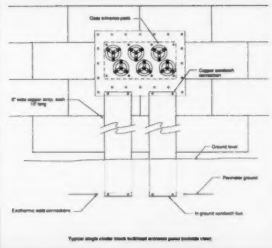

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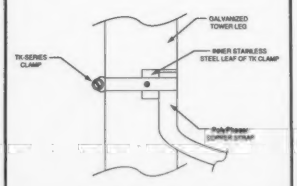

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73 Book Review

by David A. Clingerman W6OAL

Practical Antenna Handbook

Practical Antenna Handbook, by Joseph J. Carr
First Edition, 1989
Tab Books
Blue Ridge Summit PA 17294-0850
(Also available from Uncle Wayne's Bookshelf)
Price Class: $22

I don't usually get terribly excited over a book, but this is one that I couldn't put down.

It starts off with a very informative introduction that every ham will appreciate. The flow of the chapters is interesting, and logical. The book leads up to construction, rather than popping it on you first thing. This way the "old pro" can thumb to what he/she wants, and the beginner can work toward the meat and learn a lot along the way.

The chapters on propagation and transmission lines set the stage for later discussions. Mr. Carr received a lot of his material, as he states, from an old army training manual (TM 11-666), "Antennas and Propagation." I used the same manual when I designed a course on radio propagation, and I consider it a classic.

The "Transmission Lines" chapter contains many no-nonsense equations, and that's really all we need to understand and construct transmission lines. My college experience with transmission lines was most grueling because, for the text, the professor suggested a Schaum Series on the subject. The second page contained every partial differential equation known to man or woman. Carr doesn't do this to us. Nowhere in the book does he show us Maxwell's equations, may they rest in peace.

I enjoyed "The Smith Chart" chapter. Carr's approach is much like that of Sol Lapatine in his book, *Electronics in Communication*, Editions 1 and 2, which I use as a text in another of my courses. Without an understanding of the Smith chart, stubs and matching sections become very difficult.

The practical examples and good exercises presented are akin to a self-pacing text, which I like. Carr stresses safety quite a bit throughout the book and I feel that this is good, especially now as we are learning more and more about the biological effect of radiation on the human body. His mention of ways of keeping RF out of the shack, and of where those high voltage nodes are, should be heeded by everyone.

Carr doesn't forget that some of us are townhouse and apartment dwellers, and some of us have to live with covenants. He has something for us so we can be on the air, maybe not with a 4-element all-band quad, but with something with which we can get out.

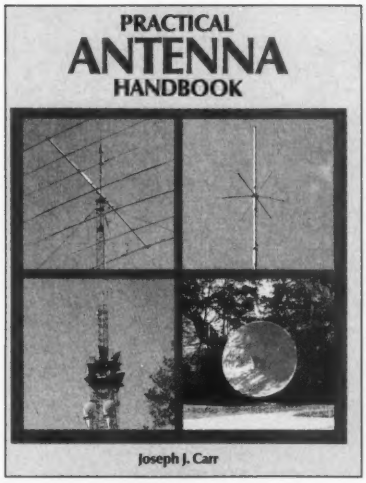

Photo. Practical Antenna Handbook.

His chapters on VHF/UHF covered the material adequately. I felt that there were a few holes, but the main points were covered. I also felt that the scanner and log periodic arrays could have had a bit more elaboration. The "Marine Radio Antennas" chapter was very good, including much attention to detail and excellent definition.

The only place where I thought more pictorials could have been helpful was the section on waveguides. I think it's easier to see TM and TE modes than to describe them. The microwave chapter fell down a little in that some substance was lacking concerning horns, loop yagis, and dipole/reflector feeds. I also feel that the section on mobile antennas could've been more extensive. Carr makes up for this with his section on matching. There were some very good hints on emergency antennas, and the measurements section had something for everyone. The construction techniques were adequate but short; the grounding section was very good. The appendices ("DXing the Smart Way," "Decibels," "Sources of Supply," and "Computer Programs for Antenna Design") were very informative, and there was plenty for the hackers.

Overall, I was impressed, and I highly recommend this book as either a reference or a text. As an engineering instructor, I plan to use this text for my course, "Practical Antenna Engineering." 73

David Clingerman W6OAL is currently employed by the U.S. Dept. of Commerce, NTIA, National Institute of Telecommunication Sciences in Boulder, Colorado.

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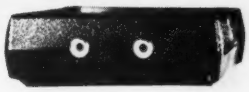

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73 Review *by Jim Gray W1XU*

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The Happy HalfSquare™

Inexpensive gain in a compact package.

The AntennasWest HalfSquare is a simple, light, unobtrusive and inexpensive gain antenna that you can erect almost anywhere you can put a dipole. This useful antenna is rugged, neat, and plain terrific!

What kind of an antenna is a half-square? Read on.

Antenna Evolution

Nearly everyone has heard of the quad antenna, or the cubical quad array. The plain quad consists of a full wavelength of wire laid out in a rectangle, usually a square. A single quad loop has 1 to 2 dB of gain over a dipole, making it worth obtaining. A cubical quad array is merely two quad loops in a "space cube" figure. The array produces even more gain, something on the order of 5 to 6 dB over a half-wave dipole.

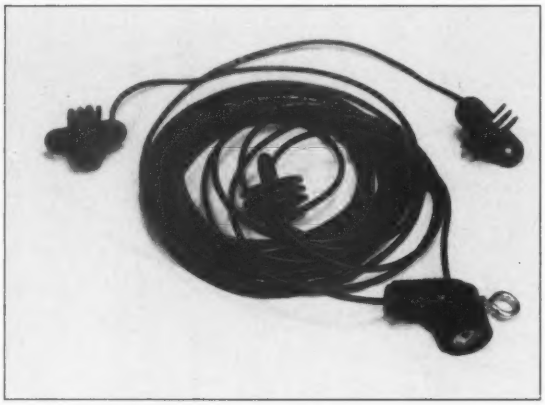

Photo. The happy HalfSquare.

Now for the HalfSquare

The half-square antenna is just a single quad loop, opened up and stretched out to give greater gain and a lower radiation angle (see Figure 1). In the half-square configuration, that simple wavelength of wire is good for about 4 dB of gain. How does it happen? Simple. The source of the quad's gain is the separation between portions of the antenna having in-phase currents. By opening the loop and increasing the separation between the in-phase segments to a half wavelength, we more than double the gain of the quad loop. That's the secret of the half-square.

There's another advantage to the half-square method of using a wavelength of wire. Typically, a full-wave loop has a feedpoint impedance in excess of 100 ohms. That requires some sort of matching system. But if the half-square is fed at the right point, it has a perfect match to common 50 ohm coaxial cable.

Corner Feed

Let's return to the quad loop as a comparison. Since it is a complete loop, it will have the same impedance no matter where you feed it. But once you cut the loop and stretch it out, creating a half-square, the impedance seen by a feedline will depend on where you attach it to the wire. If you place the feedpoint at one end of the wire, the impedance will be on the order of a thousand ohms. But if you feed the half-square at a quarter wave from the end, at either of the corners, you will see an impedance of about 50 ohms—a nice match to coax without any tuner or matching transformers.

Corner feed has practical advantages, too. You can support your feedline with the antenna support itself, so you can bring the antenna closer to the house or shack. You can also use lighter supports.

To understand why corner feed works this way, think of the half-square as a pair of half-wave dipoles. Old-time antenna manuals used to feature the "quarter-up quarter-over" dipole. This consisted of a dipole with one vertical and one horizontal leg. Imagine two of these end-to-end and fed in phase.

The horizontal legs would have the same potential at their ends, so they might as well be joined. If joined, there is no need for two feedpoints; one is sufficient. The resulting antenna is the half-square. The radiation from the horizontal legs is self-canceling, but the radiation from the vertical legs is additive. The result is 4 dB of gain from an antenna that's the same length as a simple dipole (see Figure 2).

More important than the gain is the lower angle of radiation from the half-square. In fact, at the low angles that favor DX, the half-square has given me up to two S-units of signal improvement over a dipole at the same height. The drooping ends, the half-wave spacing, and the corner-feed system are the secrets of the half-square's great performance and good impedance matching.

Clever Construction

The AntennasWest HalfSquare is a delight to work with. The wire used in its construction is heavy-duty, black QuietFlex™ that resists kinking. In fact, I even tied it in a knot to test it. After untying it, I could find no visible damage or deformation. The wire's tough plastic covering makes it totally impervious to the environment. That means no noise from rain and snow, wind, or wind-born dust like we experience in Arizona. Under the insulation, the wire surface stays shiny-bright.

At the corner feedpoint there is a specially-

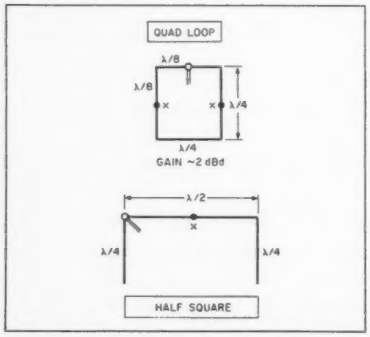

Figure 1. Cutting the quad loop and opening it out produces the HalfSquare. The half-wave spacing more than doubles the gain over the quad loop and the higher feedpoint gives a lower angle of radiation.

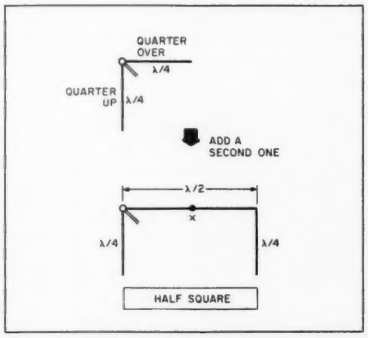

Figure 2. Evolution of the HalfSquare from a phased dipole pair. Connecting two quarter-up/quarter-over dipoles eliminates need for second feedpoint. Gain over a single dipole is on the order of 4 dB.

made housing that accepts the coaxial connector from your feedline. The connection is surrounded by a unique drip shield that keeps weather away from the mating surfaces. The housing also has a strain relief attachment point for the support rope that you use to attach the corner to the house, tree, mast, or whatever support you choose.

The two free ends of the antenna have a novel insulator that serves two purposes: The one we all know about—insulation—and the other, making tuning adjustments. A slip-and-lock arrangement permits easy adjustments of the length of the wire, which simplifies fine tuning for resonance.

AntennasWest makes HalfSquare antennas for each of the amateur bands, as well as for other bands where commercial, military, or industrial frequencies are used. Since an antenna that transmits well also receives well, it's no surprise that many HalfSquares are used for monitoring broadcasts from sensitive spots around the globe.

HalfSquares can be coiled, slipped into plastic bags with resealable tops, and carried in a suitcase. A HalfSquare needs no tuner to properly match the input/output impedance of even the most sensitive solid-state transceiver. The HalfSquare is an ideal portable DXpedition antenna.

If it's your pleasure to operate on more than one band (as most of us do), don't expect the HalfSquare to act like a beam on other than the band it was cut for. But don't be surprised to find that your antenna tuner will load it easily as a random wire on many other bands. As a random wire, my 20 meter HalfSquare has given service on 75, 40, 30, 17, 15, and 12 meters.

You might want to buy a HalfSquare for each band you operate on. Or you might get a HalfSquare for the band where DX competition is the greatest, or where you have DX goals, then use a general coverage antenna, like the G5RV, for rag-chewing. Many hams that run traffic to the South Pole or maintain schedules over long paths have found the half-square more consistent in performance than beam antennas because of its lower angle of radiation.

The price of AntennasWest HalfSquares built for the 10 and 12 meter bands is $40; for the 15 and 17 meter bands, $45; for the 20 meter band, $50; for the 30 meter band, $60; and for the 40 meter band, $70. Allow $5 for shipping and handling.

Conclusions

I am very happy with my AntennasWest HalfSquare. It's got a lot going for it with neatness, "invisibility" (it doesn't attract attention from the neighbors), a rugged and weatherproof design, usable DX gain, simplicity, and instant-easy use with any transmitter. I highly recommend them! 73

Jim Gray W1XU, 210 Chateau Circle, Payson, Arizona 85541, has been 73's *Propagation columnist since 1984. He's been a ham for 39 years, and likes to operate CW on WARC bands 12, 17, and 30. He's also interested in aviation and photography.*

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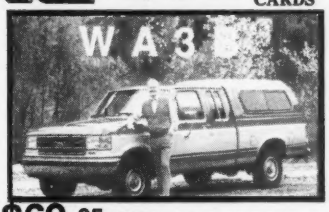

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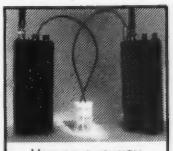
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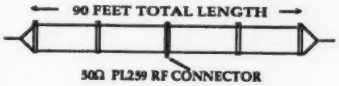

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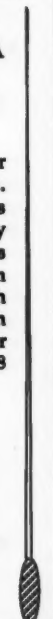
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Collinear for Two Meters

An inexpensive, efficient antenna.

by F.W. Lee G3YCC

In these days of black boxes, including all-singing, all-dancing multimode transceivers, the construction of antennas is one of the few worthwhile, practical options left for the radio amateur interested in 2 meters.

Two meter collinears remain one of the most popular choices for base stations, and there are many commercial designs available. However, I intend to show that for a minimal outlay and a few pleasant minutes of work, using readily to hand components, you can make an efficient antenna.

This antenna consists of two half-waves in phase with a quarter-wave matching section, or stub, allowing a good match to coaxial cable of 50 to 75 ohms (see Figure 1).

Construction

The raw materials you need are minimal and inexpensive, even if you have to buy them. But, we hope, you can find most of what you need around the garage or junk box.

First, you'll need two 39 inch long pieces of aluminum tube ½" (12.5mm) in diameter. You could salvage a TV antenna to obtain this.

Next, you need at least a 25" piece of 1¼" (29mm) PVC plumber's tubing and a length of #16 copper wire. You could cull these items from an old power transformer or, as in my case, from a length of hard-drawn copper wire left over from an HF antenna project.

The only item you'll most likely have to buy is the moulded dipole centerpiece, which is readily available at hamfests and ham shops.

Strengthen the PVC tubing by inserting a bung of wood or some other material in both ends for about 3" (75mm). It's particularly important to make rigid the end you're going to clamp to the support.

Cut a 40¼" length of #16 wire to make the quarter-wave matching stub. Solder a lug on one end of the wire and secure it under the nut or wingnut of the top element. Pull the wire 19½" (495mm) away from the attachment point while passing it along the top of the PVC tube. Then drill a small hole through the tube at this point and push the wire through. Bring the wire back along the bottom of the tube to the centerpiece, solder another tag to the end, and secure it to the bottom element. It's advisable to tape the wire to the tube as you go, to help keep the wire straight.

The dipole centerpiece supports the half-wave sections and the PVC tube by using fixing bolts. You might also use some sort of clamp to fasten the finished antenna to the mast or support. These are cheap. Brass or other metal studding can be pressed into service, too. Construction details are shown in the Figure and Photo.

Adjustments

No actual tuning is required, but you have to use the shack rig and an SWR meter to figure out the tapping points for the coaxial cable. Do this with the antenna in the clear, preferably with the full length of coaxial cable temporarily connected. Although the antenna is fairly broadband in operation, I'd recommend you adjust it with the shack transceiver set at a mid-band point.

Make adjustments with minimum power,

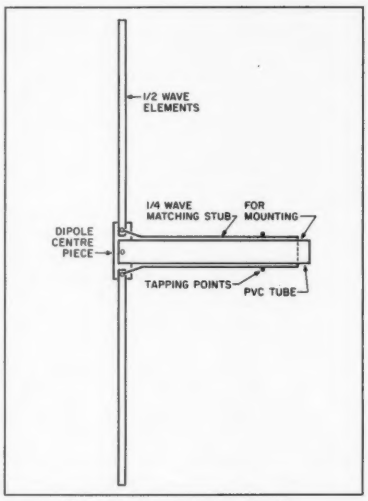

Figure. Construction details.

and take care to switch the power OFF before you touch the antenna—RF hurts! A starting position of 12¼" (312mm) is given for the tapping points, but you must move both of these until minimal reflected power is shown on the SWR meter. The inner cable is tapped along the top wire, and the braid is tapped to a point opposite it on the lower wire. When you find the optimum points, solder these connections.

Now, waterproof the antenna. There are many products you can use, ranging from polyurethane varnish to bath sealant.

The antenna is ready for mounting in its permanent position on a mast or other support. You'll realize best results, of course, from an antenna mounted on a high point, such as a chimney lashing, mast or pole, using a minimum of coaxial cable.

This antenna should give years of good service for little expense, and it can be easily made in an afternoon. No specialized tools are needed. Even if all the material were bought, it's doubtful that the bill would exceed ten dollars, representing a considerable savings over any commercial vertical. The prototype cost me about half that, using materials to hand.

I'm sure you will enjoy the building experience, and you'll obtain a lot of satisfaction in having "done it yourself." 73

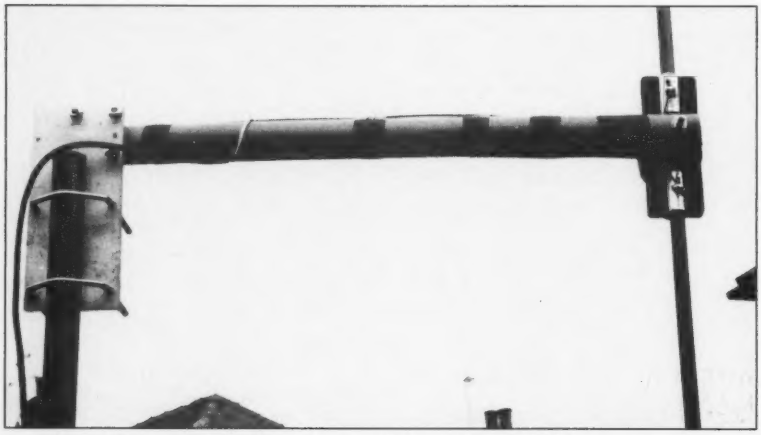

Photo. The completed collinear showing the mounting and feedpoint arrangement.

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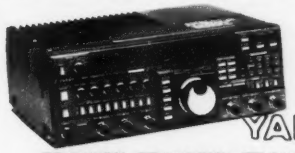

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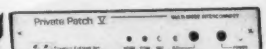

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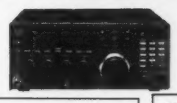

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Simple SupeRX

A super-small superhet for 80, 40, or 30m.

by Bruce O. Williams WA6IVC

A few years back, I developed the Simpleceiver (see the September 1986 issue of *QST*) using a ceramic 455 kHz filter. I decided to adapt that design to a receiver using more sophisticated components. The result is the Simple SupeRX described here. It uses just four 8-pin ICs, and receives CW and SSB equally well. With a reasonably well-stocked junk box, the total cost of the project is probably less than $40. How you package and tune your receiver has a big impact on cost, however. If you have to buy all of the components, plan on spending about $55.

The Design

There is nothing particularly exotic about the design. (See Figures 1 and 2.) The NE602 is used as both a mixer and a product detector; U1 is the mixer, and the NE602 is used in a Hartley-oscillator configuration. I've found that using this type of oscillator is much simpler than the more common Colpitts type. Using a combination of subminiature monolithic capacitors, with silver-micas for the smaller values, results in an oscillator with almost no discernible drift. It is stable enough for extended SSB reception immediately after applying power.

The input voltage to both NE602s is regulated at +5V to add to the stability. U5 is a small, 100 mA voltage regulator. Since we only need about 3 or 4 mA for each NE602, there is very little stress on the regulator. The +5V is also the voltage source for gain control through the MC3340.

The Murata CFU455 series of ceramic filters is available from a few sources, although the cost of the device has increased considerably since I first started using it. There are several different versions of the CFU455, designated as A through J. The CFU455I has a −6 dB bandwidth of 2 kHz; the H version has a bandwidth of 3 kHz. Either version will work well in this application—for SSB, the H filter may be a little better.

Losses through the filter are made up by using an MC3340 variable attenuator (U2). This nomenclature is confusing, since the device is actually a variable-gain amplifier. The MC3340 is similar to some of the TV IF-amplifier chips, but it is much easier to use and offers two different ways of controlling gain through the stage. A 50k ohm variable resistor from pin 2 to ground will afford over 60 dB of attenuation. As an alternative, a positive voltage in the range of 0 to 5 volts applied to pin 2 will give the same result. This allows us to use the variable resistor for gain control, and to use a positive voltage from a transmitter keying circuit to reduce the gain through the receiver while using the receiver as a keying monitor. Although Figure 1 shows gain control through a 0 to 5 VDC source, either method can be used. The maximum gain through the MC3340 is about 16 dB—just enough to allow good headphone volume, or drive a small speaker.

Another NE602 at U3 acts as a product detector. The 455-kHz Hartley-oscillator configuration is extremely stable (on my old frequency counter, I measured less than 10 Hz drift from a cold start). The differential audio output of the product detector is routed through a Bessell filter centered at about 700 Hz, and applied to the two inputs of U4, an LM380N-8 audio amplifier chip. I found that the LM380N-8 chip, with a fixed gain of 34 dB, gives adequate audio output, but does not suffer from some of the internally generated hiss and noise that the LM386 sometimes

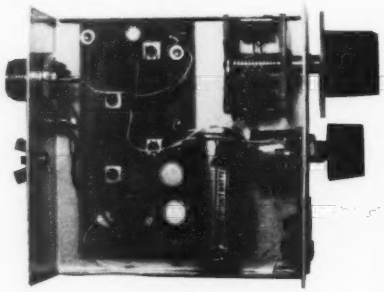

Photo A. The Simple SupeRX.

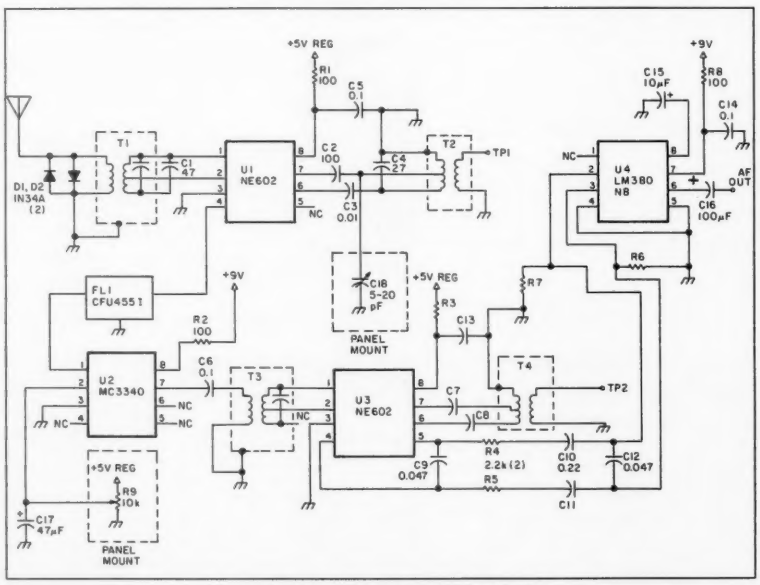

Figure 1. Schematic for the Simple SupeRX.

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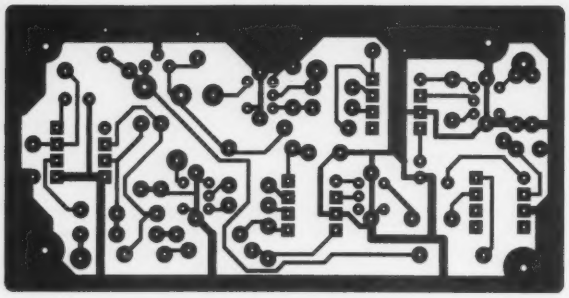

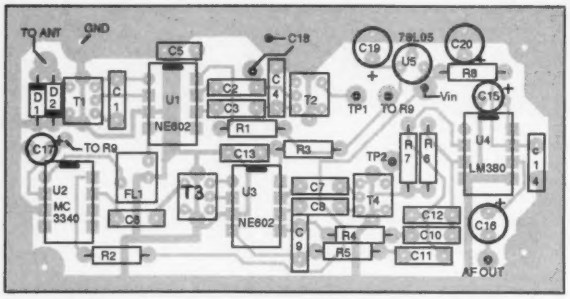

Figure 2. (a) Foil diagram, and (b) parts placement.

contributes. If you find that the LM380 doesn't have the gain you need, however, you can substitute an LM386 with just a slight change in the pin-out. The audio output can also be increased by using different values for the components in the audio filter. Changing R4 and R5 to about 1500 ohms will increase the audio output.

Construction

The table at right lists sources of parts. A printed-circuit board is available from FAR Circuits, and I am presently buying parts and assembling kits. Figure 2(a) shows the PCB layout, and Figure 2(b) shows component placement on the board. Even if you plan to build only one SupeRX, I recommend that you obtain the PC board, since it speeds construction. I've found that a receiver board can be completed in less than 2 hours.

For the prototypes, I used a product called "printed stripboard" that is available at very low cost from Dick Smith Electronics. PN H5614, the 3¾" x 3" printed stripboard, has a pattern of 0.1" wide strips that are drilled at 0.1" centers to allow mounting and soldering of parts to the board. The strips can be cut with an X-acto® knife or a special strip cutter marketed by Dick Smith to terminate the cir-

SupeRX Parts List

Part	Value	Type	
C1	47 pF	silver-mica or polystyrene	
C2	100 pF	silver-mica or polystyrene	
C3	0.01µF	polystyrene or monolithic	
C4	27 pF	silver-mica or polystyrene	
C5	0.1µF	ceramic disc or monolithic	
C6	0.1µF	polystyrene or monolithic	
C7	0.022µF	polystyrene or monolithic	
C8	0.1µF	polystyrene or monolithic	
C9	0.047µF	monolithic	
C10	0.22µF	monolithic	
	0.15µF*	(alternate)	
C11	0.22µF	monolithic	
	0.15µF*	(alternate)	
C12	0.047µF	monolithic	
C13, C14	0.1µF	ceramic disc or monolithic	
C15	10µF	electrolytic, 16V	
C16	100µF	electrolytic, 16V	
C17	47µF	electrolytic, 16V	
C18	5–20 pF	panel mounted tuning capacitor	
C19, C20	220µF	electrolytic, 16V	
D1, D2	1N34A	germanium diode or equivalent	
R1, R2, R3, R8	100 ohm, ¼W	carbon composition	
R4, R5	2.2k, ¼W	carbon composition.	
	1.5k	(alternate)	
R6, R7	10k, ¼W	carbon composition	
R9	10k	potentiometer	
T1, T2	10.7 MHz	microminiature (7mm) IF transformer, green core	Mouser PN 42IF223
T3, T4	455 kHz	microminiature (7mm) IF transformer, black core	Mouser PN 42IF203
U1, U3	NE602	double-balanced mixer	
U2	MC3340	variable attenuator	
U4	LM380N-8	audio amplifier	
U5	78L05	100 mA miniature +5V regulator	

* C10 and C11 can range from 0.1 to 0.22µf. Valves greater than 0.33 cause distortion.

Other: Printed stripboard, DSE PN H5614 or equivalent, cabinet, plastic stick-on feet, 4-40 hardware, etc.

Sources for Parts

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Note: You can get a drilled and plated PCB from FAR Circuits (N9ATW), 18N640 Field Ct., Dundee IL 60118. Price: $4.50 + 1.50 shipping each.

For a complete circuit board kit, you can also write to me at MXM Industries, Rt 1 Box 156-C, Smithville TX 78957. Tel. (512) 237–3906. Price for the kit, which includes the circuit board and all components is $49.95 plus $4.00 S&H. Texas residents add sales tax. Call for any hard-to-find parts.

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CT-125	10 Hz–1.25 GHz	< 25mV to 50 MHz < 15 mV to 500 MHz < 100 mV to 1 GHz	9	0.1 Hz, 1 Hz, 10 Hz	$189.95
CT-250	10 Hz–2.5 GHz typically 3.0 GHz	< 25 mV to 50 MHz < 10 mV to 1 GHz < 50 mV to 2.5 GHz	9	0.1 Hz, 1 Hz, 10 Hz	$239.95
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FM-3, complete unit includes case, battery, switch, antenna, and built-in condensor mike. Excellent fidelity, very small, kit $16.95
FM-3WT, as above, but fully wired and tested $19.95
SMC, miniature sensitive mike cartridge for FM-1, 2, 4 ..... $ 2.95

MICROWAVE INTRUSION ALARM

A real microwave Doppler sensor that will detect a human as far as 10 feet away. Operates on 1.3 GHz, and is not affected by heat, light, or vibrations. Drives up to 100 mA output, normally open or closed, runs on 12 VDC.
Complete kit MD-3 . $16.95

MUSIC MACHINE

Neat kit that will produce 25 different classical and popular tunes, plus 3 doorchime sounds. Lots of fun for doorbells, shop, or store entrances, car horn, music boxes, etc. Runs on 9V battery or wall transformer. Excellent speaker volume and adjustable tempo and pitch. Add our case set for a handsome finished look.
Complete kit, MM-5 ..... $24.95
Case + knob set, CMM-5 $12.95

PACKET RADIO

Commodore C64/128 packet radio interface. Uses famous German Digicom software. Features EXAR IC chip set for reliable operation—runs HF or VHF tones. Includes FREE disk software. PC board, all necessary parts and full documentation.
Complete kit, PC-1 ..... $49.95

LO NOISE PREAMPS

Make that reciever come ALIVE! Small size for easy installation with Hi-Q tuned input for peak performance. Excellent gain and noise figure—guaranteed to improve reception! Specify band: 2M—PR-10, 220 MHz—PR-220, 440 MHz—PR-40.
Each kit $17.95

TONE DECODER

A complete tone decoder on a single PC board. Features: 400–5000 Hz adjustable range via 20-turn pot, voltage regulation, 567 IC. Useful for touch-tone burst detection, FSK, etc. Can also be used as a stable tone encoder. Runs on 5 to 12 volts.
Complete kit, TD-1 . $5.95

VOICE ACTIVATED SWITCH

Voice activated switch kit provides switched output with current capability up to 100 mA. Can drive relays, lights, LED, or even a tape recorder motor. Runs on 9 VDC.
VS-1 kit. $6.95

TELEPHONE TRANSMITTER

Mini-sized with professional performance. Self-powered from phone line, transmits in FM broadcast band up to ¼ mile. Installs easily anywhere on phone line or inside phone!
PB-1 kit $14.95

TICKLE STIK

A shocking kit! Blinking LED attracts victims to pick up innocent-looking can—you watch the fun! Ideal for office desks, parties, nosey know-it-alls!
TS-4 kit $9.95

TV TRANSMITTER

Transmit your VCR or TV camera throughout your house. Stable quality signal, tunable Ch 4–6. Accepts standard video and audio inputs.
Complete kit,
JM-7 ..... $14.95

COLOR ORGAN

See music come alive! 3 different lights flicker with music. One light each for high, mid-range, and lows. Each individually adjustable and drives up to 300 W. Runs on 110 VAC.
ML-1 kit. $8.95

LIGHT BEAM COMMUNICATORS

Transmits audio over infrared beam up to 30'—use simple lenses to go up to ¼ mile! Hum free, uses 30 kHz carrier. Great for wireless earphones or undetectable "bug."
Transmitter + receiver set, LB56 .. $19.95

FM RADIO

Full-fledged superhet, microvolt sensitivity, IC detector and 10.7 MHz IF. Tunes Std. FM broadcast band as well as large portions on each end. Ideal for "bug" receiver, hobby experiments or even as FM radio!
FR-1 kit $14.95

SUPER SLEUTH

A super sensitive amplifier which will pick up a pin drop at 15 feet! Great for monitoring baby's room or as general purpose amplifier. Full 2W rms output. Runs on 6 to 15 volts, uses 8–45 ohm speaker.
BN-9 kit $5.95

BROADBAND PREAMP

Very popular sensitive all-purpose preamp, ideal for scanner, TVs, VHF/UHF rigs, counters. Lo noise, 20 dB gain, 100 kHz–1 GHz, 9V–12 VDC operation.
SA-7 kit $14.95

NEW FANTASTIC 2M FM TRANSCEIVER

SYNTHESIZED—NO CRYSTALS TO BUY!

$129.95

Ramsey breaks the price barrier on 2 meter rigs! Here's the ideal rig for field days, hamfests, vacations, second cars and packet (it even has dedicated packet connections). Six expandable diode-programmed channels, 5W RF output, sensitive dual conversion receiver and EASY assembly. Why pay more for a secondhand old rig when you can make your own for less. Have some fun with your own truly AMERICAN-MADE FM rig! This kit comes complete except for the case, mike and speaker—ICOM or equal speaker-mikes plug right in. Add our own beautiful case set for a professional factory look.
FTR-146 kit $129.95
FTR-146-C aluminum case & knob set $24.95

2 M & 220 BOOSTER AMP

Here's a great booster for any 2 meter or 220 MHz hand-held unit. These power boosters deliver over 30 watts of output, allowing you to hit the repeater's full quieting while the low noise preamp remarkably improves reception. Ramsey Electronics has sold thousands of 2 meter amp kits, but now we offer completely wired and tested 2 meter, as well as 220 MHz, units. Both have all the features of the high-priced boosters at a fraction of the cost.
PA-10 2 MTR POWER BOOSTER (10 X power gain)
Fully wired & tested $79.95
PA-20 220 MHz POWER BOOSTER (8 X power gain)
Fully wired & tested $79.95

QRP TRANSMITTERS

20, 30, 40, 80M CW TRANSMITTERS

Join the fun on QRP! Thousands of these mini-rigs have been sold and tons of DX contacts have been made. Imagine working Eastern Europe with a $30 transmitter—that's ham radio at its best! These CW rigs are ideal mates to the receivers at right. They have two-position variable crystal control (one popular QRP XTAL included), one watt output and built-in antenna switch. Runs on 12VDC. Add our matching case and knob set for a handsome finished look.
Your choice of bands $29.95
(Specify band: QRP-20, 30, 40 or 80)
Matching case & knob set, CQRP $12.95

HAM RECEIVERS

20, 30, 40, 80M All Mode RECEIVERS

Build your own mini ham station. Sensitive all-mode AM, CW, SSB receivers use direct conversion design with NE602 IC as featured in *QST* and ARRL handbooks. Very sensitive varactor tuned over entire band. Plenty of speaker volume. Runs on 9V battery. Very EASY to build, lots of fun and educational—ideal for beginner or old pro. New 30-page manual. Add the case set for well-fitted professional look.
Your choice of bands $27.95
(Specify band: HR-20, HR-30, HR-40, HR-80)
Matching case & knob set, CHR $12.95

E-Z KEY CMOS KEYER

Send perfect CW within an hour of receiving this kit! Easy-to-build kit has sidetone oscillator, speed control and keys most any transmitter. Runs for months on a 9V battery. 28-page manual gives ideas on making your own key for extra savings. Add our matching case set for complete station look.
CW-7 kit $24.95
Matching case knob set, CCW $12.95

ACTIVE ANTENNA

Cramped for space? Get longwire performance with this desktop antenna. Properly designed unit has dual HF and VHF circuitry and built-in whip antenna, as well as external jack. RF gain control and 9V operation makes unit ideal for SWLs, traveling hams or scanner buffs who need hotter reception. The matching case and knob set gives the unit a hundred dollar look!
AA-7 Kit $24.95
Matching case & knob set, CAA $12.95

SPEECH SCRAMBLER

Communicate in total privacy over phone or radio. Kit features full duplex operation using frequency inversion. Both mike and speaker or line in/out connections. Easy hookup to any radio, and telephone use requires no direct connection! Easy to build 2 IC circuit. Can also be used to descramble many 2-way radio signals. Finish your kit off with the handsome case & knob set.
SS-7 kit $29.95
Matching case & knob set, CSS $12.95

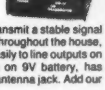
SHORTWAVE RECEIVER

Fantastic receiver that captures the world with just a 12" antenna! Can receive any 2 MHz portion from 4–11 MHz. True superhet has smooth varactor tuning, AGC, RF gain control, plenty of speaker volume and runs on a 9V battery. Fascinating Scout, school or club project provides hours of fun for even the most serious DXer. For the car, consider our shortwave converter. Two switchable bands (in 3–22 MHz range), each 1 MHz wide—tunable on your car radio dial. Add some interest to your drive home!
Shortwave receiver kit, SRI $27.95
Shortwave converter kit, SCI $24.95
Matching case set for SRI, CSR $12.95
Matching case set for SCI,CSC $12.95

2, 6, 10 MTR, 220 FM RECEIVERS

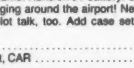
Keep an ear on the local repeater gang, monitor the cops, check out the weather or just plain listen around. These sensitive superhet receivers are just the ticket. They tune any 5 MHz portion of the band and have smooth varactor tuning, dual conversion with ceramic IF filters, AFC, adjustable squelch and plenty of speaker volume. Runs on 9V battery and performance that rivals the big rigs! For a complete finished pro look, add our matching case and knob set with screened graphics.
FM communications receiver kit $29.95
Specify band: FR 146 (2m), FR6 (6m), FR10 (10m), FR-220 (220 MHz)
Matching case & knob set, CFR $12.95

FM STEREO TRANSMITTER



Run your own stereo FM station! Transmit a stable signal in the standard FM broadcast band throughout the house, dorm or neighborhood. Connects easily to line outputs on CD player, tape decks, etc. Runs on 9V battery, has internal whip antenna and external antenna jack. Add our case set for a "station" look!
FM-10 kit $29.95
Matching case set, CFM $12.95

AIRCRAFT RCVR



Hear exciting aircraft communications—pick up planes up to 100 miles away! Receives 110–136 MHz AM air band, smooth varactor tuning superhet with AGC, ceramic filter, adjustable squelch, excellent sensitivity and lots of speaker volume. Runs on 9V battery. Great for air shows or just hanging around the airport! New 30-page manual details pilot talk, too. Add case set for "pro" look.
AR-1 kit $24.95
Matching case set, CAR $12.95

TERMS: Satisfaction guaranteed: examine for 10 days. If not pleased, return in original form for refund. •Add 7% (up to a maximum of $10) for shipping, handling and insurance. •For foreign orders add 15% for surface mail. •COD (USA only): add $4.50. •Orders under $20, add $3.00. •NY residents, add 7% sales tax. •90-day parts warranty on kits. •1-year parts & labor warranty on wired units.

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CIRCLE 34 ON READER SERVICE CARD

COMMUNICATIONS ELECTRONICS INC.™

Emergency Operations Center has expanded to our new two acre facility and World Headquarters. Because of our growth, CEI is now your *one stop source* for emergency response equipment. When you have a command, control or communications need, essential emergency supplies can be rushed to you by CEI. As always, for over twenty two years, we're ready, willing and able to help.

Our RELM two-way radio transceivers were especially created for government agencies. When you need to talk to police, fire, ambulance, or state, federal and international response forces, RELM transceivers may be quickly programmed for up to 48 frequencies. Listed below, are some of our most asked about transceivers. For additional assistance, call CEI at 313-996-8888.

NEW! RELM® RSP500-A

List price $465.00/**CE price $319.95/SPECIAL**
20 Channel • 5 Watt • Handheld Transceiver
Frequency range: 148-174 MHz. continuous coverage. Will also work 134-148 MHz. with reduced performance.
The *RELM* RSP500B-A is our most popular programmable 5 watt, 20 channel handheld transceiver. You can scan 20 channels at up to 40 channels per second. It includes CTCSS tone and digital coded squelch. Snap on batteries give you plenty of power. Additional features such as time-out timer, busy-channel lockout, cloning, plug-in programming and IBM PC compatability are standard. It is F.C.C. type accepted for data transmission and D.O.C. approved. We recommend also ordering the **BC45** rapid charge 1½ hour desk battery charger for $99.95, a deluxe leather case **LC45** for $48.95 and an external speaker microphone with clip **SM45** for $59.95. Since this radio is programmed with an external programmer, be sure to also order one **PM45** at $74.95 for your radio system.

NEW! RELM® UC102/UC202

List price $128.33/**CE price $79.95/SPECIAL**
CEI understands that all agencies want excellent communications capability, but most departments are strapped for funds. To help, CEI now offers a special package deal on the RELM UC102 one watt transceiver. You get a UC102 handheld transceiver on 154.5700 MHz., flexible antenna, battery charger and battery pack for only $79.95. If you want even more power, order the RELM **UC202** two watt transceiver for $114.95.

NEW! RELM® RH256NB-A

List price $449.95/**CE price $299.95/SPECIAL**
16 Channel • 25 Watt Transceiver • Priority Time-out timer • Off Hook Priority Channel
The *RELM* RH256NB is the updated version of the popular RELM RH256B sixteen-channel VHF land mobile transceiver. The radio technician maintaining your radio system can store up to 16 frequencies without an external programming tool. All radios come with CTCSS tone and scanning capabilities. This transceiver even has a priority function. Be sure to order one set of programming instructions, part # **PI256N** for $10.00 and a service manual, part # **SMRH256N** for $24.95 for the RH256NB. A 60 Watt VHF 150-162 MHz. version called the **RH606B** is available for $429.95. A UHF 15 watt, 16 channel similar version of this radio called the **LMU15B-A** is also available and covers 450-482 MHz. for only $339.95. An external programming unit **SPM2** for $49.95 is needed for programming the LMU15B UHF transceiver.

NEW! RELM® LMV2548B-A

List price $423.33/**CE price $289.95/SPECIAL**
48 Channel • 25 Watt Transceiver • Priority
RELM's new LMV2548B gives you up to 48 channels which can be organized into 4 separate scan areas for convenient grouping of channels and improved communications efficiency. With an external programmer, your radio technician can reprogram this radio in minutes with the **PM100A** programmer for $99.95 without even opening the transceiver. A similar 16 channel, 60 watt unit called the **RMV60B** is available for $489.95. A low band version called the **RMLL60A** for 30-43.000 MHz. or the **RMLL60B** for 37-50.000 MHz. is also available for $489.95.

RELM® Programming Tools

If you are the dealer or radio technician maintaining your own radio system, you **must** order a programming tool to activate various transceivers. The **PCKIT010** for $149.95 is designed to program almost all RELM radios by interconnecting between a MS/DOS PC and the radio. The **PM100A** for $99.95 is designed to externally program the RMV60B, RMLL60A, RMLL60B and LMV2548 radios. The **SPM2** for $49.95 is for the LMV25B and LMU15B transceivers. The **RMP1** for $49.95 is for the RMU45B transceiver. *Programmers must be used with caution and only by qualified personnel because incorrect programming can cause severe interference and disruption to operating communications systems.*

★★★ *Uniden* CB Radios ★★★

The *Uniden* line of Citizens Band Radio transceivers is designed to give you emergency communications at a reasonable price. Uniden CB radios are so reliable they have a two year limited warranty.

PRO310E-A *Uniden* 40 Ch. Portable/Mobile CB . . . $72.95
PRO330E-A *Uniden* 40 Ch. Remote mount CB . . . $99.95
GRANT-A *Uniden* 40 channel SSB CB mobile $152.95
WASHINGTON-A *Uniden* 40 ch. SSB CB base . . . $209.95
PC122-A *Uniden* 40 channel SSB CB mobile . . . $113.95
PC66A-A *Uniden* 40 channel CB Mobile $78.95
PRO510XL-A3 *Uniden* 40 channel CB Mobile $34.95
PRO520XL-A3 *Uniden* 40 channel CB Mobile $49.95
PRO535E-A *Uniden* 40 channel CB Mobile. $73.95
PRO538W-A *Uniden* 40 ch. weather CB Mobile . . . $78.95
PRO640E-A3 *Uniden* 40 ch. SSB CB mobile $133.95
PRO810E-A *Uniden* 40 channel SSB CB Base . . . $174.95

★★★ *Uniden* Radar Detectors ★★★

Buy the finest *Uniden* radar detectors from CEI today.
CARD-A3 *Uniden* credit card size radar detector. . . $127.95
RD3XL-A3 *Uniden* 3 band radar detector. $124.95
RD9GTL-A *Uniden* "Passport" size radar detector. . . $89.95
RD9XL-A3 *Uniden* "micro" size radar detector . . . $107.95
RD25-A *Uniden* visor mount radar detector $54.95

Bearcat® 200XLT-A

List price $509.95/**CE price $239.95/SPECIAL**
12-Band, 200 Channel • 800 MHz. Handheld Search • Limit • Hold • Priority • Lockout
Frequency range: 29-54, 118-174, 406-512, 806-956 MHz. Excludes 823.9875-849.0125 and 868.9875-894.0125 MHz.
The *Bearcat* 200XLT sets a new standard for handheld scanners in performance and dependability. This full featured unit has 200 programmable channels with 10 scanning banks and 12 band coverage. If you want a very similar model without the 800 MHz. band and 100 channels, order the **BC 100XLT-A3** for only $179.95. Includes antenna, carrying case with belt loop, ni-cad battery pack, AC adapter and earphone. Order your scanner now.

Bearcat® 800XLT-A

List price $549.95/**CE price $239.95/SPECIAL**
12-Band, 40 Channel • No-crystal scanner Priority control • Search/Scan • AC/DC
Bands: 29-54, 118-174, 406-512, 806-912 MHz.
Now...nothing excluded in the 806-912 MHz band.
The Uniden 800XLT receives 40 channels in two banks. Scans 15 channels per second. Size 9¼" x 4½" x 12½." If you do not need the 800 MHz. band, a similar model called the **BC 210XLT-A** is available for $178.95.

NEW! Uniden® MR8100-A

Call 313-996-8888 for special CEI pricing
12-Band, 100 Channel • Surveillance scanner
Bands: 29-54, 116-174, 406-512, 806-956 MHz.
The *Uniden* MR8100 surveillance scanner is different from all other scanners. Originally designed for intelligence agencies, fire departments and public safety use, this scanner offers a breakthrough of new and enhanced features. Scan speed is almost 100 channels per second. You get four digit readout past the decimal point. Complete coverage of 800 MHz. band when programmed with a personal computer. Alphanumeric designation of channels, separate speaker, backlit LCD display and more. To activate the many unique features of the Uniden MR8100 a computer interface program is available for $19.95. Due to manufacturers' territorial restrictions, the MR8100 is not available for *direct* shipment from CEI to CA, OR, WA, NV, ID or UT.

NEW! Ranger® RCI2950-A3

List price $549.95/**CE price $259.95/SPECIAL**
10 Meter Mobile Transceiver • Digital VFO Full Band Coverage • All-Mode Operation Backlit liquid crystal display • Repeater Splits RIT • 10 Programmable Memory Positions
Frequency Coverage: 28.0000 MHz. to 29.6999 MHz.
The *Ranger* RCI2950 Mobile 10 Meter Transceiver has everything you need for amateur radio communications. The RF power control feature in the RCI2950 allows you to adjust the RF output power continuously from 1 watt through a full 25 watts output on USB, LSB and CW modes. You get a noise blanker, roger beep, PA mode, mike gain, digital VFO, built-in S/RF/MOD/SWR meter. Frequency selections may be made from a switch on the microphone or the front panel. The RCI2950 gives you AM, FM, USB, LSB or CW operation. For technical info, call Ranger at 619-259-0287.

RELM LMV2548B Only $289.95

OTHER RADIOS AND ACCESSORIES

XC365-A *Uniden* Ultra Clear Plus Cordless Phone. . . $89.95
CT785S-A *Uniden* speakerphone cordless phone. . . $109.95
BC55XLT-A *Bearcat* 10 channel scanner $114.95
AD100-A Plug in wall charger for BC55XLT. $14.95
PS001-A Cigarette lighter cable for BC55XLT $14.95
VC001-A Carrying case for BC55XLT. $14.95
BC70XLT-A *Bearcat* 20 channel scanner. $159.95
BC142XL-A *Bearcat* 10 ch. 10 band scanner $84.95
BC147XLT-A *Bearcat* 16 ch. 10 band scanner $94.95
BC172XL-A *Bearcat* 20 ch. 11 band scanner. $134.95
BC177XLT-A *Bearcat* 16 ch. 11 band scanner . . . $134.95
BC590XLT-A *Bearcat* 100 ch. 11 band scanner. . . . $194.95
BC760XLT-A *Bearcat* 100 ch. 12 band scanner. . . . $254.95
BC002-A CTCSS tone board for BC590/760XLT $54.95
BC003-A Switch assembly for BC590/760XLT $22.95
BC855XLT-A *Bearcat* 50 ch. 12 band scanner . . . $199.95
BC1-A *Bearcat* Information scanner with CB $129.95
BC330A-A *Bearcat* Information scanner $99.95
BC560XLT-A *Bearcat* 16 ch. 10 band scanner $94.95
BP205-A Ni-Cad batt. pack for BC200/BC100XLT. . . $39.95
TRAVELLER2-A *Grundig* shortwave receiver $89.95
COSMOPOLIT-A *Grundig* shortwave receiver $199.95
SATELLIT500-A *Grundig* shortwave receiver $679.95
SATELLIT650 *Grundig* shortwave receiver. $949.95
ATS803A-A *Sangean* shortwave receiver. $159.95
74102-A *Midland* emergency weather receiver $39.95
77116-A *Midland* CB with VHF weather & antenna. . . $66.95
77118-A *Midland* CB mobile with VHF weather $62.95
77913-A *Midland* CB portable with VHF weather $79.95
76300-A *Midland* CB base station $92.95
FBE-A Frequency Directory for Eastern U.S.A. $14.95
FBW-A Frequency Directory for Western U.S.A. $14.95
RFD1-A MI, IL, IN, KY, OH, WI Frequency Directory . . . $14.95
RFD2-A CT, ME, MA, NH, RI, VT Directory $14.95
RFD3-A DE, DC, MD, NJ, NY, PA, VA, WV Dir. $14.95
RFD4-A AL, AR, FL, GA, LA, MS, NC, PR, SC, TN, VI . . . $14.95
RFD5-A AK, ID, IA, MN, MT, NE, ND, OR, SD, WA, WY . . . $14.95
RFD6-A CA, NV, UT, AZ, HI, GU Freq. Directory. . . . $14.95
RFD7-A CO, KS, MO, NM, OK, TX Freq. Directory $14.95
PWB-A Passport to World Band Radio $16.95
ASD-A Airplane Scanner Directory. $14.95
TSG-G7 "Top Secret" Registry of U.S. Govt. Freq. . . . $16.95
TTC-A Tune in on telephone calls. $14.95
CBH-A Big CB Handbook/AM/FM/Freeband. $14.95
TIC-A Techniques for Intercepting Communications . . . $14.95
RRF-A Railroad frequency directory $14.95
EEC-A Embassy & Espionage Communications. . . . $14.95
SMH-A2 Scanner Modification Handbook, Vol. 2 . . . . $18.95
LIN-A Latest Intelligence by James E. Tunnell. $16.95
A60-A Magnet mount mobile scanner antenna $34.95
A70-A Base station scanner antenna $34.95
USAMM-A Mag mount VHF ant. w/ 12' cable $39.95
USAK-A ¾" hole mount VHF ant. w/ 17' cable $34.95

Add $4.00 shipping for all *accessories* ordered at the same time. Add $15.00 shipping per radio and $4.00 per antenna.

BUY WITH CONFIDENCE

Michigan residents please add 4% sales tax or supply your tax I.D. number. Written purchase orders are accepted from approved government agencies and most well rated firms at a 10% surcharge for net 10 billing. All sales are subject to availability, acceptance and verification. Prices, terms and specifications are subject to change without notice. All prices are in U.S. dollars. Out of stock items will be placed on backorder automatically or equivalent product substituted unless CEI is instructed differently. A $5.00 additional handling fee will be charged for all orders with a merchandise total under $50.00. Shipments are F.O.B. CEI warehouse in Ann Arbor, Michigan. No COD's. Not responsible for typographical errors.

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CIRCLE 121 ON READER SERVICE CARD

cuit. This product is easy to use, and inexpensive, so you may not want to use a circuit board. The 40-meter prototype unit that I built used a piece of printed stripboard measuring 3⅜″ x 2″. I cut that board from PN H5112, a larger panel of stripboard.

If you opt for using printed stripboard, plan on spending several hours in construction. Before you start soldering IC sockets and transformers onto the printed stripboard, take time to plan the position of each major element. Use the general layout shown in Figure 2(b) for placement of the components. Taking time to plan in the beginning will be worth it later in saved time and materials. Always leave a spare hole on the strip, if you can—you may want to add some components later. Insert the various components into the board for planning, then sketch the layout. I start by locating the audio amplifier, then I work backwards through the circuit. I mount the components and solder them in the same sequence.

The choice of a cabinet is entirely up to you. Since there are only two controls, volume and tuning, a very simple package is possible. I obtained my tuning capacitor from BCD Electro. It is a small, inexpensive, single-gang unit with a built-in reduction drive. Its capacity range is about 5 to 20 pF, which gives a tuning range from 7.000 MHz to about 7.225 MHz to cover most of the 40 meter band. If you use a larger tuning capacitor, you should place a small capacitor in series with the tuning unit to reduce the range. You'll have to experiment a bit to get the right value. Of course, you could use a voltage-variable-capacitor tuning scheme with just another potentiometer on the panel, rather than a tuning capacitor.

The problem of a tuning indicator is easy to solve. You will find that for most purposes, you will be able to guess at your calibration. If you use a tuning capacitor with a built-in reduction drive, you can allow the inner 1:1 shaft to protrude a little through the front panel, and use a ¼″ collet with a pointer soldered on it to indicate the received frequency with a calibrated dial pasted on the front panel. I use the ¼″ insert from an old dial knob. Most old knobs have brass inserts, and you can remove the insert from the knob with a hacksaw. It is a simple matter to solder a brass indicator to the insert and install it inside the cabinet on the inner shaft. Allow just enough of the insert to protrude through the panel to give you a 1:1 tuning indicator.

Powering Up

The choice of power for the unit is easy! At high volume, the SupeRX draws about 30 mA. I use a 9 volt transistor radio battery mounted in the cabinet, with a subminiature open-circuit jack to allow hookup of an external battery or wall-transformer 9-to-12 volt supply. A 9 volt transistor battery will last for several hours, but for extended use, I recommend a larger 9-to-12 volt battery or other power source. Be forewarned that most of the cheaper wall-transformer units are designed for battery charging, and have only half-wave rectifiers with practically no filtering—they create so much hum or noise that they're unusable!

I hate winding toroids, and as a result, I've never really learned how to do it well. There are no toroids in the SupeRX! Instead, I use microminiature 10.7 MHz and 455 kHz transistor radio IF transformers. Be sure you get the smaller (7mm) "microminiature" units—their pins are just the right spacing for stripboard, and they fit the available PC board. You will have problems mounting the larger (10mm) "subminiature" transformers.

One of the "rules" for using the NE602 mixer is that input pins 1 and 2 must not be directly connected to ground. Any padding capacitors must be connected across the tuned portion of the input transformer, and the "retuned" portion isolated from ground as shown in Figure 1. If you build your unit for 30 meters, no additional padding capacitors across the transformer are required. If you are going to be on 40 or 80 meters, you will have to add capacitors across the tuned circuit in the transformer—about 47 pF for 40 meters, and about 240 pF, or more, for 80 meters. Remember to include the tuning capacitor capacitance in the calculation—that is, for 40 meters, the value of C4 should be about 27 pF since the tuning capacitor has about 20 pF, maximum.

Alignment

You need no special test equipment to align your SupeRX. There are only four adjustments, all of them to the transformers and requiring only a screwdriver. Remember to use an insulated screwdriver or tuning tool. I solder pieces of scrap component leads to the secondaries of the oscillator transformers, (marked TP1 and TP2 on the schematic), and use my frequency counter or oscilloscope for a rough calibration. If you don't have a scope or a counter, you can use your receiver for a rough calibration. Connect a short piece of hookup wire to the receiver antenna, and place the wire near to the oscillator you are checking. Remember that since we are using a 455 kHz IF, the local oscillator will be operating at 455 kHz above or below the received signal. Thus, to get a rough alignment at 7.000 MHz, you would tune your oscillator to either 6.545 or 7.455 MHz. Most ham band receivers have sufficient out-of-band range to allow you to tune the mixer oscillator.

Aligning the 455 kHz oscillator in the product detector can be done in the way described above. If you do not have a scope or counter, you can use an AM broadcast receiver. Almost all BC receivers have a 455 kHz IF. If you couple your product-detector oscillator to the BC receiver with a short piece of hookup wire loosely wound around or placed near the oscillator transformer and the BC radio IF transformers, you can tune the oscillator close to 455 kHz. Tune for a zero beat from the BC receiver. The final tuning of the BFO is accomplished with on-the-air signals.

All additional "fine tuning" is done with the SupeRX operating. The input transformer, T1, is peaked on an incoming signal, as is the 455 kHz coupling transformer, T3. The tuning of the product-detector oscillator should be done on an SSB signal—if you tune the BFO so that you can copy an LSB signal, the frequency of the oscillator is properly located near the edge of the IF passband, affording near single-signal reception—optimum for CW reception.

Conclusion

There you have it, a simple but adequate receiver for CW or SSB. I have found that although many designers bad-mouth the NE602 because of its limited dynamic range, it performs more than adequately for a simple CW receiver. It offers a lot of features that other devices don't: low cost, availability, and ease of use and alignment. I added a switchable 10 dB attenuator in the antenna input, which reduces some of the high-level signals we find on 40 meters down here in Texas. The *ARRL Handbook* gives values for different degrees of attenuation.

I have coupled my 40 meter SupeRX to a 2W crystal controlled transmitter. I use the 12 volt keyed voltage to attenuate the MC3340 gain to allow using the receiver as a keying monitor. It works OK, but I still haven't solved all of the audio thumping problems. At present, it's better to use a panel switch for changing from receive to transmit.

You can adapt any one of several excellent transmitter designs in the literature, I'm sure, to give you a small, easy-to-build QRP rig with excellent performance at minimum cost. A $1,000 rig to work CW is not at all necessary! 73

You may reach Bruce O. Williams WA6IVC at Rt. 1 Box 156-C, Smithville TX 78957.

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First out, *Radio Fun* is aimed at helping newcomers to amateur radio to both get their higher class licenses and to have more fun with the tickets they have. This means we'll be running simple theory articles to help you actually learn how electronics and radio work. That's a lot better than memorizing the Q&A baloney and feeling dumb for the rest of your life. We're talking simple, so don't panic. Much of this will be the same as we'll be using to teach 5th-8th grade students about electronics and communications.

No, it isn't going to be all theory. The name is *Radio Fun*, so we'll be reviewing every kit we can get our hands on. The idea is to get you to buy, assemble and use all kinds of gadgets - some for amateur radio, some not. There's nothing like building to actually get familiar with electronics and turn book theory into practical understanding.

We'll have columns on activities which are geared to Novices and Techs. We'll be trying to get you involved with repeaters, packet radio, SSB on 2m, satellite communications, DXing on 10m, and stuff like that. We'll also be urging you to forget how much you hate the code and learn it Uncle Wayne's way so you can go on to General and Advanced tickets. How else can we get you up on 15m and 20m so you can help clean up the mess the Extras have made of those bands? We need your help...badly.

Yes, we'll be running stuff on QRP (rigs running under one watt), on hidden transmitter hunting, on how to cope with overbearing old timers at ham club meetings, on how to find parts, on how to put up simple antennas...things like that.

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73 Review

by Bill Clarke WA4BLC

The Carolina Windom 160

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Recently, I decided to become active on 160 meters. It was either that or miss out on one of my evening nets for the remainder of the winter. Remembering that this project would be used for SSB rag-chewing and not heavy-duty DX, I went over the various antenna answers that are generally thought of for 160. I eliminated some of them as requiring too much work (ground radials, etc.) or as too limiting (monoband). Then, along came the Carolina Windom 160, from The Radio Works, another version of that marvel W8GZ gave us back in 1928.

In December 1988 I reviewed the Carolina Windom standard 80–10 version. I used it for many months at my Virginia QTH, then moved it to my new QTH. With a tuner, its versatility allowed me to operate on any of the bands, including WARC, from 80 through 10 meters.

This multiband versatility was what attracted me to the 160 version of the Windom. I could use it on top band and all the other bands, too. It could act as a backup to my trusty dipole on 75, and see primary use on 40 and up. Not bad for one wire.

A "Package of Antenna"

The package the 160 comes in will surprise you. It's a plastic bag, of some weight, containing the wire elements (265 feet of #14 multistrand copper wire), a 22-foot RG-8X vertical radiator, a line isolator, and a matching unit (used like a center insulator). Now, before you ask . . . if you want, you can order the 160 with #12 stranded copper or copper-weld wire. In locations prone to high winds, the latter may be a prudent choice, but my 160 has experienced winds in excess of 75 mph and suffered no failures.

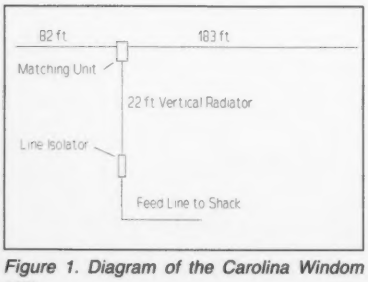

Figure 1. Diagram of the Carolina Windom 160.

Photo A. The Carolina Windom 160 package, unassembled.

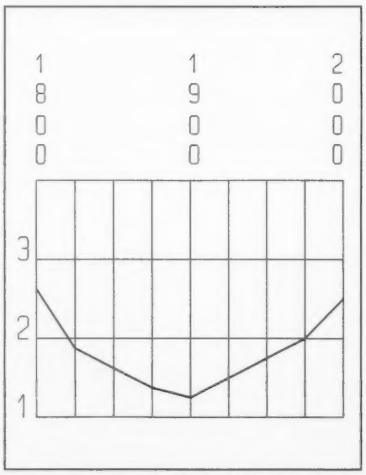

Figure 2. SWR plot of the Windom on 160 meters.

Installation

I installed the 160 in a drooping dipole manner: the highest point at 48', with the ends dropping down to about 20'. Keeping the ends in the air avoids possible contact with unauthorized creatures (deer, cows, neighbor's kids, etc.). The 160 is supported about 15 feet from the matching unit (center insulator) and vertical radiator. A movable insulator is placed on the long element just for this purpose. This is to eliminate the possibility of interaction between the tower and the radiator. The line isolator is about 18 feet in the air.

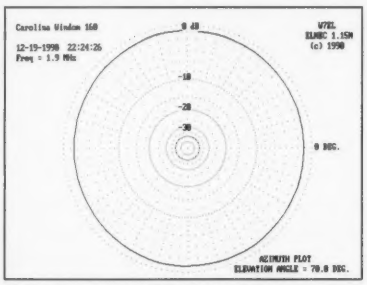

Figure 3. Azimuth plot of the Windom on 160 meters (using ELNEC 1.15M).

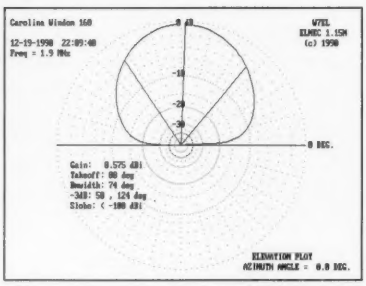

Figure 4. Elevation plot of the Windom on 160 meters.

Tuning

The SWR curve is gentle and I am able to operate from 1.825 MHz to 1.975 MHz without needing a tuner. On the remaining bands (80–10), the use of a tuner is mandatory. However, all bands tuned easily and appear relatively broad.

How It Works

The Windom is fed off-center. In fact, this model is fed about 50' off-center. Therefore, because an unbalanced condition exists at the feed point (the RF current is out of bal-

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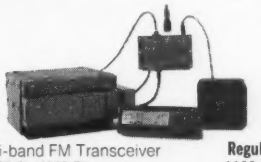

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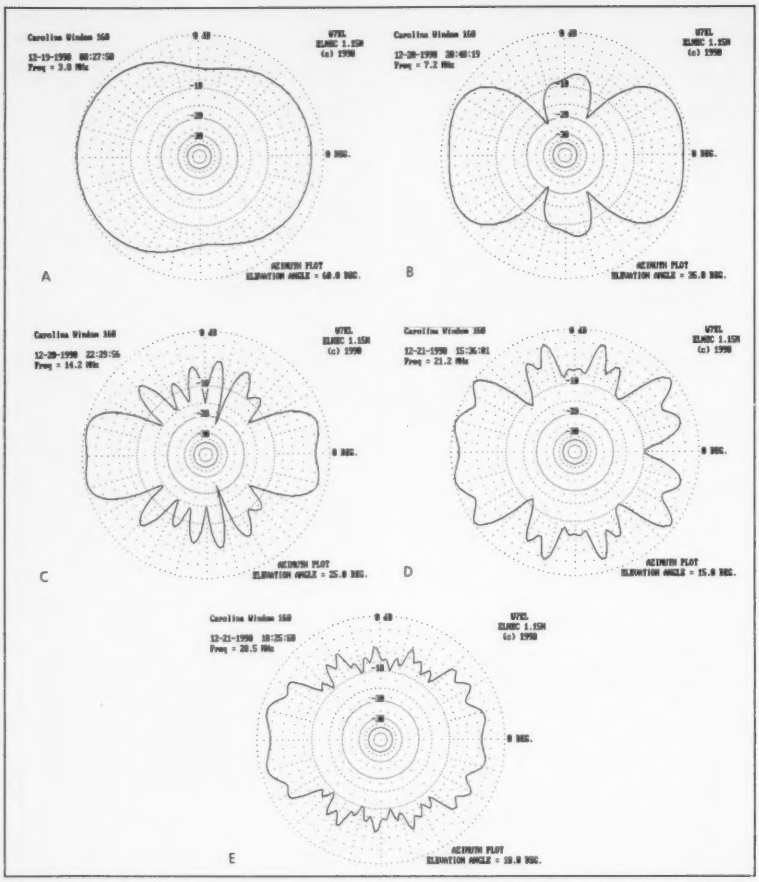

Figure 5. The Carolina Windom 160's azimuth pattern for 75m (a), 40m (b), 20m (c), 15m (d) and 10m (e). meters.

ance), the coaxial feedline will radiate. This is a planned condition and is the reason this type of Windom is so effective on the higher bands.

Naturally, you don't want to have uncontrolled radiation from the feedline. To limit it, a line isolator has been installed at the feed line end of the vertical radiator (22 feet down). From this point to the transmitter there will be no feedline radiation.

The vertical radiator, in the case of higher frequencies, gives the effect of an inverted vertical antenna. The horizontal elements continue to radiate as would be expected, giving a combination of horizontal and vertical radiation.

As with all multiband wire antennas, some gain and directivity will be attained as the frequency goes up.

On The Air

On 160 meters, I consistently work up and down the East Coast and am very pleased with the good reports I get. Of course, you must remember that with the antenna as low as it is (48'), DX will indeed be rare.

Specifications

Freq. Coverage	160–10 meters
Gain	As much as 10 dBd
Size	265' H x 22' V
Polarization	Vertical & horizontal
Feed Line	50Ω coax
Matching method	See text
Power rating	1500W recommended
Height	40' (usable at 35')

On 75 meters, for contacts under 1,500 miles, I have found that it is generally 5 to 10 dB down when compared to my 75 meter dipole at the same height. This is a general statement, as there have been exceptions to the rule. Beyond 1,500 miles, the Windom takes over, usually 5 or 10 dB ahead of the dipole.

On 40 meters, there is a slight edge with the Windom. Consistently, whether DX or local, the Windom wins over the inverted vee by about an S-unit.

On 30 meters and up, the Windom is all I have at the present time. There is no tribander or other fancy array to compare it with, but I'm very satisfied with the Windom's overall performance. I did, for a short time, compare the original Carolina Windom to the 160. Although there were a few times when one or the other seemed to be slightly ahead, there was generally no difference. End result: An improved antenna that didn't take away from the original version.

The Plots

The plots shown in Figures 3 through 7 were done with ELNEC (see my review in *73*, January 1991), and printed on a Canon Laser printer.

Nice Points

All the pre-made connections were good and solid. The vertical radiator, a piece of RG-8X coax, is pre-made with an end connector and the line isolator installed. There is a small movable insulator on the longest leg to facilitate hanging the antenna. Coax Seal comes with the antenna. . . use it, it'll save you grief later on down the road.

Problems

Of course, the 160 does have a few drawbacks. Specifically, its size of 265 feet. Having used wire antennas in many difficult and small installations, I can assure you that some bending of the end elements is quite acceptable. Signal degradation will be negligible, unless you actually fold the wires back on themselves. So don't be daunted by restrictive lot sizes.

Final Remarks

Would I recommend it? Yes, the Carolina Windom 160 is a really good all-around antenna that works well on the lower bands and exhibits gain and directivity on the upper bands. Due to the vertical radiator, it is a step ahead of the typical multiband wire antenna, as seen in the plots. The size is somewhat formidable, but the Carolina Windom 160 is a single antenna that does it all from local 160/75 round tables to 10 meter DX. 73

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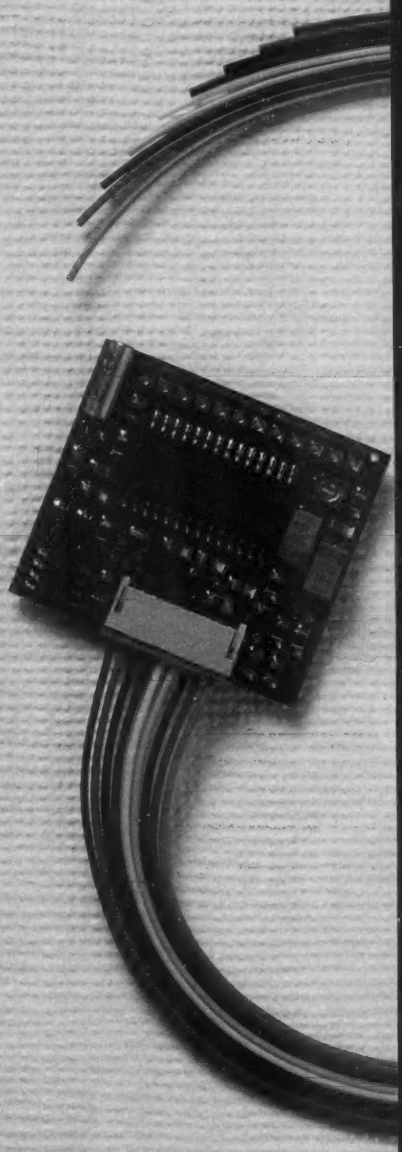

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- Automatic squelch tail elimination by turn off code detection

Encode

- Golay 23 bit digital word sent at 134.4 Hz data rate
- Turn off code of 134.4 Hz sine wave for 180ms sent to eliminate receiver squelch tail
- Output Z is 2.2k, AC coupled, and adjustable from 0-3v
- Open collector high current transistor for P.T.T. keying
- Test code to set transmitter modulation level included

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73 Review

by Bill Clarke WA4BLC

Ameritron's AL-811 Linear Amplifier

Get the real thing at the right price.

Ameritron
921 Louisville Road
Starkville MS 39759
Tel. (601) 323–9715
Price Class: $599

In the world of linear amplifiers, only one factor seems to be emphasized: cost. The higher the cost, the better the amplifier. And the better the amplifier, the better the signal. Hmm, the latter is an interesting premise, but not necessarily tr[illegible].

The object of a linear amplifier is to increase the RF output of your station. In simple terms, to increase the talk power. When figuring power increases, you must be aware of a general understanding among radio operators—the law of decibels.

Let's take a typical 100 watt PEP exciter (the average modern transceiver output) and double the power. The new output of 200 watts is an example of 3 dB gain. This gain represents what is considered a noticeable received signal increase, attained every time the power is doubled. This, doubled to 400 watts, makes a total gain of 6 dB; 800 watts, a gain of 9 dB; 1600 watts, a gain of 12 dB. Of course, the FCC limits power out to 1500 watts, but we won't split hairs over the extra one hundred watts for this paper exercise.

You can see from the example that the greatest gains are at the lower watt end of the scale. What, you ask, does this have to do with a review of a linear amplifier? Simple economics! It is much less expensive to attain a 9 dB gain than a 12 dB gain. In fact, going from 100 watts to 800 watts will be less expensive than going from 800 to 1600 watts. The power supply can be smaller, the tube(s) cheaper, and the internal components need not be as heavy.

Today I feel it is safe to say that you will usually spend a minimum of a thousand dollars for an amplifier that produces a 9 dB gain, and twice that for the remaining 3 dB.

With the introduction of the AL-811 amplifier, it's refreshing to see a quality amplifier for under $600.

Installation

The AL-811 comes in a double box, well-designed to protect the amplifier shipped inside. This amplifier looks like an amplifier: The case is large and the controls are not the sub-mini size we are used to on our imported rigs. The two front panel meters are well-lighted and easily read. One meter displays either high voltage (HV) or plate current (Ip), the other monitors the grid current at all times. A red LED indicates key-down, and a standby switch is included on the front panel.

Inside the AL-811 you will find three 811As in a grounded grid arrangement. This is an old and well-proven tube design, originally developed for use in RF. They are capable of handling considerable abuse at the hands of hams lacking tuning expertise. In the event of failure they are readily available for about $25 each. This is considerably less than even the 3-500Z, which now goes for well over a hundred dollars.

To prepare the unit for operation, just remove the cover's screws and lift it off. Inside you will find plastic foam around the tubes and a bag containing the neatest fuse holders and fuses I've seen recently (they push in and pop out; they're not the old screw-in type). After removing these materials and checking the tubes and other components for security, I replaced the cover, installed the fuses, and hooked the amplifier up.

While inside the unit, I took note of the very nice glass epoxy circuit boards, excellent structural design, and quality of workmanship. All was top grade. Unlike many amplifiers I have examined over the years, the chassis of the AL-811 does not use the cover as an integral part of the chassis (stiffener). It is just a cover, and no more.

The RF input circuit is a very solidly built Pi-network tuned slug system. The Pi-network output circuit is of equal quality. The power transformer connections, using a buck boost winding, can be changed to accommodate 120/110/100/240/230/220 VAC, making it workable nearly anywhere.

An ALC circuit is built into the AL-811 to prevent excessive drive levels from damaging the amplifier, and to prevent the resulting RF interference it causes.

Photo A. The AL-811 covers the 160–15 meter bands.

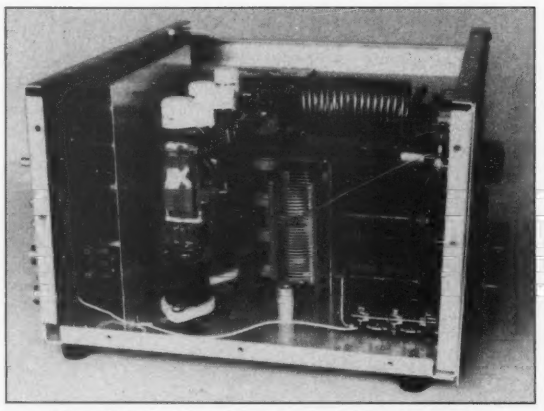

Photo B. An inside peek reveals the quality construction.

Observations

For the sake of safety, and for the edification of the many hams who have never operated anything using more than 12 VDC in the power supply, Ameritron has included internal and external labels warning of the lethal voltages present within the amplifier.

The instruction manual is short and to the point. I would advise anyone using the amplifier to read it before turning anything on. Included with the manual is a one-page generic set of instructions for tuning all linear amplifiers. This fine page should be read by all using, or contemplating using, an amplifier, as it answers many questions you might ask.

I noticed some contradictions in the manual involving input power. Depending on where you look, you might see a "never exceed" limit of

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70, 85, or 100 watts. For the purposes of this evaluation I chose the latter, as that was the power mentioned in the tune-up section.

Ameritron's one-year product warranty does not appear to include the tubes. No mention of warranty on the tubes was seen.

Using the AL-811

The AL-811 comes from the factory set up for 120 VAC. As the current draw is not high (max. of 8 A), you may not need to do any extra wiring to use the amp. This will depend upon your house or shack wiring. I can tell you, however, that if you locate the amp over fifty feet away from your circuit breaker box on a #14 line, you will experience a significant voltage drop during key-down.

My recommendation for this, or any RF amplifier, is to operate it on a circuit of its own. Plug-in power bars, although nice for powering small equipment, are not satisfactory for powering an amplifier. (See the table.)

Watching the output signal on my scope, I saw no bad news. The signal never flat-topped. In getting signal reports, I switched between the AL-811 (700 watts) and my AL-80A (900 watts). In some cases I told the receiving station what I was testing, while in other cases I kept the station in the blind. There was never a time when the AL-80A was reported better than the AL-811. Reports were "no change seen," as expected.

Due to the law of decibels, as described earlier in this article, the difference of a couple of hundred watts won't be noticed at the receiving point. Of course, you could spend another thousand dollars and get a "full power" amplifier to get that last 3 dB.

The Judgment

What I liked the most about the AL-811 included the stout chassis, inexpensive tubes, quiet fan operation (my computer makes more noise), excellent internal construction, and the 12 VDC keying circuit.

My dislikes were few. It would be nice, for example, if the meters were slightly larger. Also, I found some mistakes in the manual.

Do I recommend this amplifier to other hams? Very much so! It is cost effective, something you rarely see in ham radio these days. 73

Output Chart
(100 Watts Input)

Band	Key-down Output (Watts)
160m	670
80/75m	700
40m	640
30m	650
20m	650
17m	630
15m	640
12/10m	not tested

AL-811 Specifications

Frequency coverage:	160–15 meter bands (12/10 meter modifiable)	
Input circuit:	Pi-network with slug-tuned coils	
Output circuit:	Pi-network	
Tubes:	Three 811As in a grounded grid configuration	
Maximum drive:	85 watts	
Typical drive for rated output:	55 watts	
Power output:	30 second carrier:	550 watts
	½ hour carrier:	400 watts
	30 second PEP two-tone:	600 watts +
	½ hour PEP two-tone:	600 watts +
Efficiency:	70% or better	
ALC:	Negative-going (adjustable from 0 to 20 V)	
Power supply maximum draw:	8 amps @ 120 VAC	
Dimensions:	16"(d) x 13"(w) x 8"(h)	
Weight:	30 pounds	

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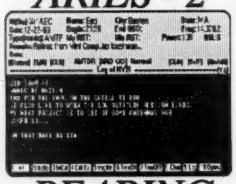

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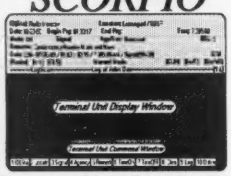

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73 Review *by Drayton Cooper N4LBJ*

SV Products' WARC Band Yagi

Model 1824/2L—a super buy!

SV Products
4100 Fahlsing Road
Woodburn IN 46797
Tel. (219) 632-4642 evenings and weekends
Price Class: $200 plus UPS.

Adding a dedicated antenna for 17 and 12 meters is a sure way to improve your performance on these bands. Until recently, there were few beams commercially available for the WARC bands, and most operators used what they had on hand: an all-band Zepp, a G5RV, a dipole, or a random wire.

The Evolution of a Dipole

Today, several manufacturers offer yagi designs for 17 and 12 meters, and the amateur operators who use them are beginning to realize the vast difference they make. One of the first 17/12 meter beams was produced in kit form by Gary Nichols KD9SV, under the trade name of SV Products.

A well-known low-band DXer, Nichols moved to 17 meters early in the game, like many other 160 meter fans, and immediately began developing an antenna for the band. His first product was a trapped rotatable dipole, which was well-received by some of the pioneer WARC band stations.

I started out with this kit, then, when he started making the 2-element kit a little over a year ago, I bought the "add-on" reflector. Two months later, I got a note from Gary telling me he had discovered that some of the stainless fittings he had bought and shipped with the kits were corroding slightly in some applications, and he was voluntarily making them good. The next day, UPS brought me a box of all-new stainless hardware. It was a nice touch.

The 2-Element Yagi

The SV Products' 2-element yagi design features an exceptionally clean pattern, moderate gain, novel trap design, compact dimensions, and ease of assembly. It's made of high quality aluminum tubing with stainless steel hardware, and it's attractively priced at $199.95 plus UPS shipping charges.

The SV Products dual-band beam has several points which make it a good choice for the ham who wants to expand his capabilities on 12 and 17 meters. Among these is the "coaxial" trap design. The traps (two per element) are completely weatherproof, immune to fouling by bugs or dirt, and able to withstand the legal power limit with ease.

Additionally, the traps should never need any adjustment, and, unless subjected to a direct lightning hit, they ought to last forever. A more complete discussion of the design of the traps can be found in the May 1990 issue of *Ham Radio*, in an article by Nichols.

KD9SV makes no gain claims for the antenna, but after a year's experience with the beam, I can assure you that its F/S ratio is excellent, and its F/B is at least as good as the computer-derived plots (see the figures). Also, the forward gain is certainly worthwhile.

The theoretical forward gain figures for this antenna, based on the computer study, are 3.96 dB for 17 meters and 3.99 dB for 12 meters. These values are certainly borne out by my experience with the antenna, and while they do not approach the figures you'd expect from a 4-element, wide-spaced monobander, they are surely respectable for a beam of this size.

The SV Products beam is directly fed with 52 ohm coax. The driven element is split at the feedpoint and insulated from the boom, obviating the need for a matching device. This system simplifies assembly considerably. Nichols strongly recommends a coaxial RF choke at the feedpoint. This choke is easily constructed by looping the feedline into an 8–10 turn coil about 6 inches in diameter just below the feedpoint.

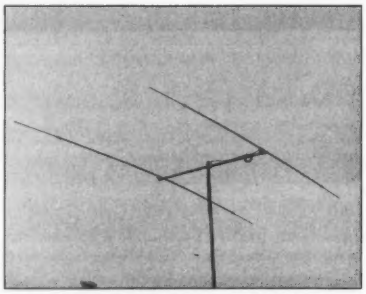

Photo. The SV Products' 1824/2L.

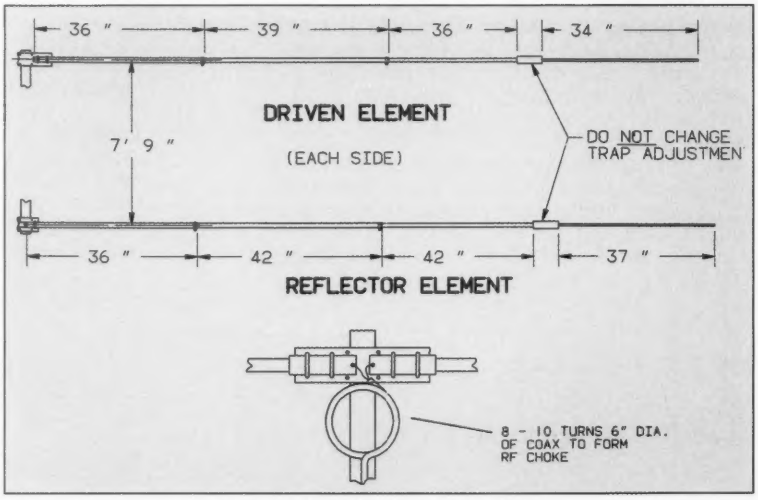

Figure 1. Element and feedpoint details.

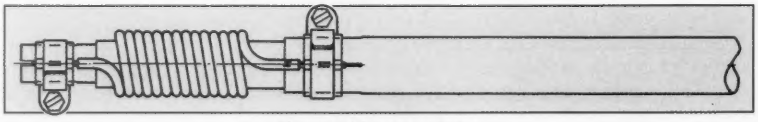

Figure 2. The coaxial trap.

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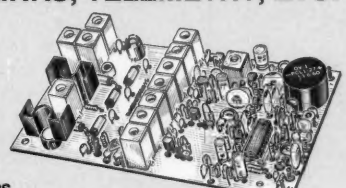

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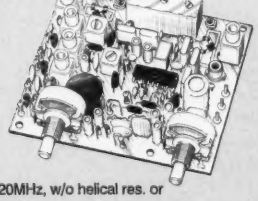

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- **R451 UHF FM RCVR,** similar to above
- **R901 902-928MHz FM RCVR.** Triple-conversion, GaAs FET front end.
- **R76 ECONOMY FM RCVR** for 6M, 2M, 220MHz, w/o helical res. or afc. Kits $129.
- **R137 WEATHER SATELLITE RCVR** for 137 MHz. Kit $129, w/t $189.

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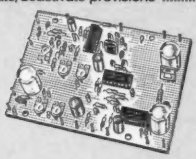

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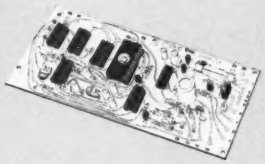
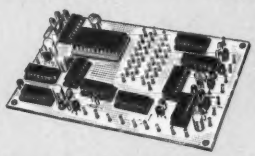


COR-4 kit. Complete COR and CWID all on one board for easy construction. CMOS logic for low power consumption. Many new features. EPROM programmed; specify call $99



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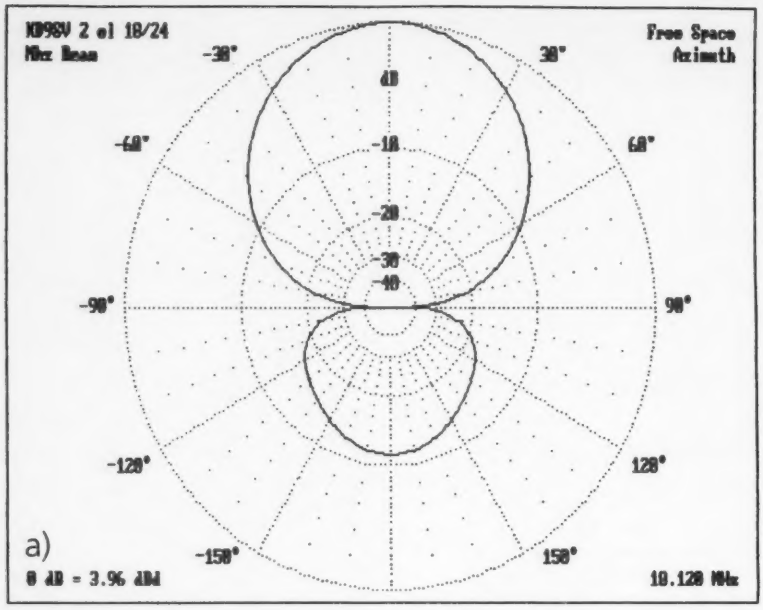
CIRCLE 57 ON READER SERVICE CARD



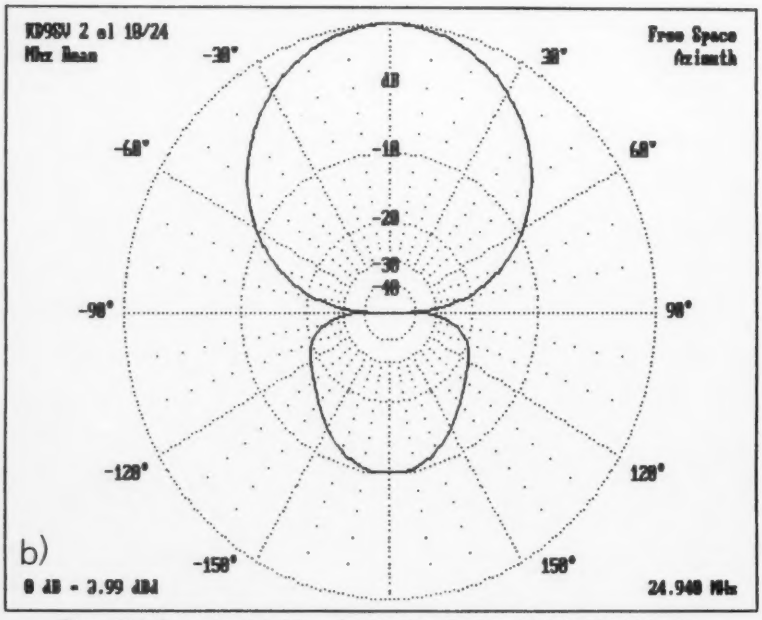


Figure 3(a). Computer plot of the azimuth pattern for 17m. (b) Azimuth plot for 12m.

Assembly, Testing, and Installation

I found construction of the antenna to be first-rate, and assembly a snap. A friend and I, working together, had the beam fully assembled and ready for testing in about an hour. The dimensional drawings provided in the package are superbly done and extremely simple to follow. No step-by-step assembly instructions come with the antenna; none are needed because of the simplicity of the design.

Nichols recommends testing the assembled beam on the ground, before you put it up on the tower. He suggests aiming it skyward, with the reflector element supported about a foot above ground, and applying enough power to check the SWR. You should see no more than a 1.5:1 SWR at this stage. The SWR will drop to about 1.2:1 when the antenna is raised to operating height.

Since the assembly dimensions are so easily followed (no fractional measurements), I simply re-checked all my figures and bypassed the ground testing phase. When placed above my tribander at 65 feet, I found my SWR figures were essentially flat over both bands at the first crack.

Now a word about the size and appearance of this beam. On the ground, the beam looks ungainly. The reflector is 26′4″ long, and the driven element is 24′6″. They are spaced just under 8 feet apart. The antenna gives the impression of being all elements and no boom. However, it is quite well-balanced, and it loses its ugly duckling appearance as soon as it goes up on the tower.

The total weight of the antenna is just 16 pounds, and it presents only 2 square feet of windloading. This makes it an ideal candidate for stacking above a moderate sized tribander. KD9SV recommends that it be stacked about eight feet above an existing array. In my case, at five feet of separation I have found no detuning effects on either the dual-bander or my existing tribander.

The boom is supplied with the kit. U-bolts that will accept a mast up to 2″ in diameter come with the kit .

Performance

No antenna review is complete without a paragraph or so on results. For each of us, the bottom line is how the antenna performs in real life.

The KD9SV beam *works*. Over the year that I've used it, it has given me absolutely trouble-free service. The reports I receive are all excellent. I enjoy DXing on 17 meters a great deal, and this beam has made the chase all the more worthwhile. There is a great deal of satisfaction in being able to break a pile-up on the first call, and this antenna has provided me with that thrill on numerous occasions.

And stateside rag-chewing is a lot more pleasant when you're not getting kicked around by QRM, too.

Because of its inherent simplicity of design, top quality compoments, ease of assembly, and high performance, the SV Products model 1824/2L beam is a highly recommended buy. 73

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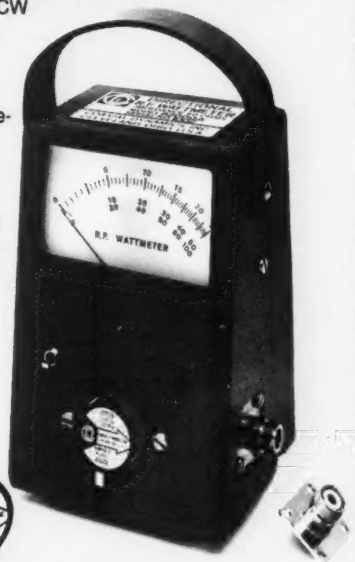

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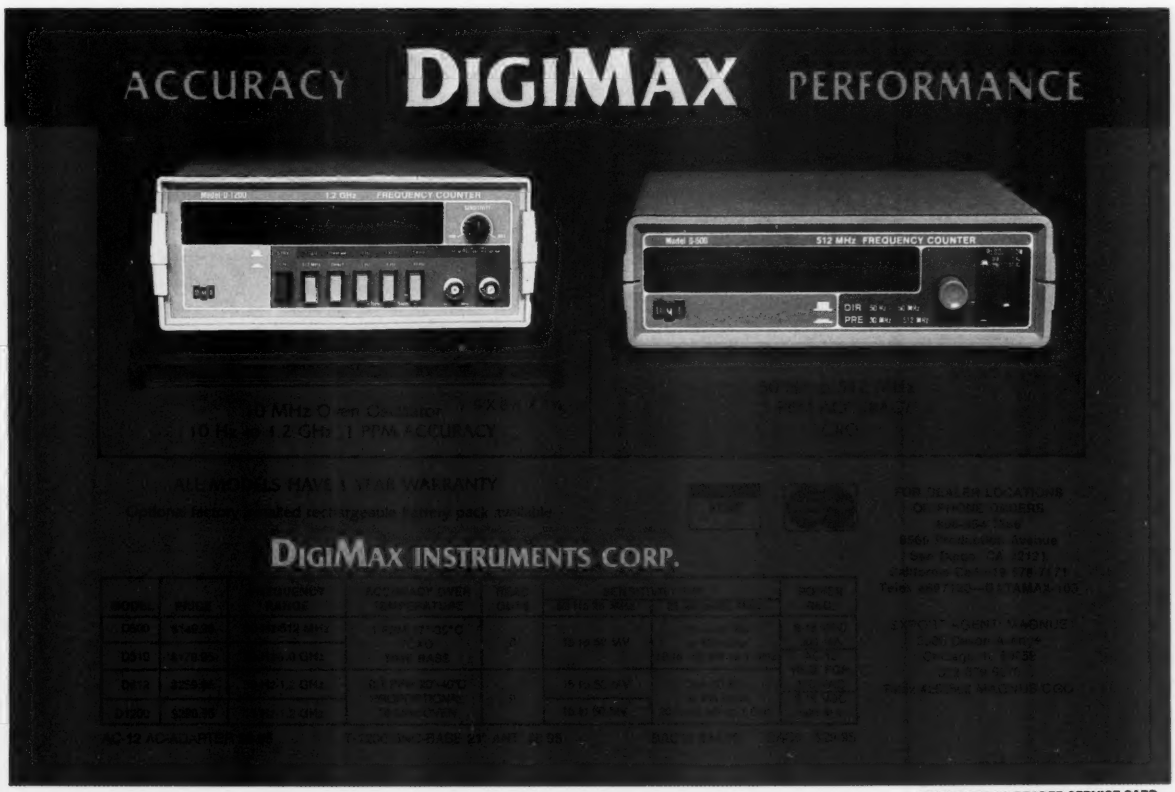

CIRCLE 155 ON READER SERVICE CARD

Pocket-Portable Seven-Band Antenna

It's cheap, easy-to-build, and effective.

by J. Frank Brumbaugh KB4ZGC

Operation during emergencies, on camping trips, or on Field Day often requires the use of less than optimum antennas. The usual wire dipole needs an antenna tuner for multiband operation, is somewhat bulky, and is subject to tangling. Separate dipoles for each band further multiply these problems. Hams living in apartments or condos who are restricted to indoor antennas especially need a better way to get on the air with an efficient antenna, but one which is not generally noticeable to the eye.

How about an antenna that covers 40 through 10 meters, is small and portable, weighs but a few ounces, is ideal for apartment or attic installation, is almost invisible when erected indoors, and can be built for $5?

The Antenna

The seven-band multiple dipole described in this article is a full-sized dipole for all bands from 40 through 10 meters. It fits in your pocket and can be erected in a few minutes. Neutral in color, it can be tacked to a wall or ceiling, ends bent as required, yet remains practically invisible to the casual visitor when used in an apartment. It is especially handy for traveling hams staying in motels.

The secret of this almost invisible antenna is the use of seven-wire flat ribbon cable. You can buy a 100-foot reel of gray ribbon cable from All Electronics Corp., P.O. Box 567, Van Nuys CA 91408 (catalog no. RCBL-7). This flat cable is less than ⅜ inch wide, making it very light and easy to erect indoors using staples or thumbtacks, or outdoors tied to trees or other supports, and equally easy to take down. With both halves rolled, it makes a package 5 inches in diameter and ¾-inch thick, easy to fit into a jacket pocket or tuck into the corner of a suitcase when traveling. The cable resists tangling because it is flat, making installation and operation much easier.

Construction

See Figure 1. Separate the seven wires for about 2 inches at one end of the cable, then strip the insulation from all seven. Twist the bared wires together and solder. This will be the feed point of one half of the antenna.

Next, measure 32 feet 8 inches from the end of the insulation at the soldered end of the cable. Cut the cable at this point. Now, repeat this entire procedure to produce another length of cable for the other half of the antenna.

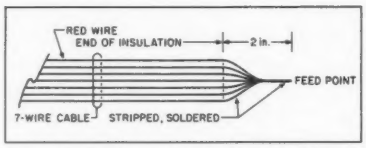

Figure 1. Feedpoint details. Strip 2 inches off of the end of the wires, twist them together and solder.

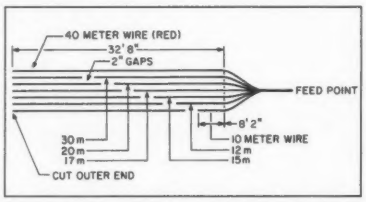

Figure 2. Construction details of the seven-band antenna. Two inch gaps are cut into the cable to isolate each resonant dipole element.

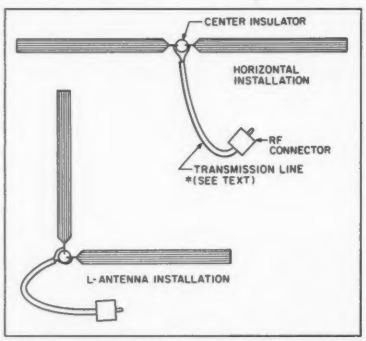

Figure 3. The completed multi-band antenna showing suggested installation configurations.

Note that the cable has the wire at one side colored red. With this wire as the 40 meter antenna, the outside gray wire across the cable will be the 10 meter antenna. Measure 8 feet 2 inches from the end of the insulation at the feedpoint. With a pair of diagonal cutters, **very carefully** cut the outside gray wire at this point, forming one half of the 10 meter antenna. Now, pull about 2 inches of the outer portion of the gray wire at the cut point loose from the cable. Cut off this short piece of wire and discard it. **Do not loosen or cut the 8-foot-2-inch wire!**

Measure 15 inches from the cut end of the 10 meter antenna on the adjacent (second) gray wire. Cut this wire carefully and remove about 2 inches of the wire towards the far end of the cable, as described above. Use a sharp knife to split the insulation between the wires on each side of the wire to be removed. This makes it easy to snip out the short length to separate the 12 meter antenna from the rest of the cable.

Measure 19 inches from the cut end of the 12 meter antenna towards the far end of the cable. Mark the third gray wire at this point. Separate and remove a 2-inch piece of wire as described above, forming the 15 meter antenna.

Measure 2 feet from the cut end of the 15 meter antenna on the fourth gray wire. Mark the wire at this point. Separate and remove a 2-inch piece of wire as described above. The fourth gray wire just prepared is the 17 meter antenna.

Measure 3 feet 6 inches from the cut end of the 17 meter antenna and mark this point on the fifth gray wire. Separate and remove a 2-inch length of wire, as above. This fifth wire is the 20 meter antenna.

Measure 6 feet 6 inches from the cut end of the 20 meter antenna, as above. Mark, cut, and discard a 2-inch length of wire from the outer part of this sixth wire. This is the 30 meter antenna.

The remaining red seventh wire is the 40 meter antenna, and is already cut to the proper length.

Now, prepare the remaining 32-foot-8-inch length of cable as just described. This forms the remaining half of the seven-band antenna.

Both lengths of cable should be identical and look like Figure 2. The 2-inch gaps in the six gray wires must be in the same places on both antenna halves. These gaps separate the outer ends of the 10-through-30 meter antennas from the unused lengths of wire in the outer portions of the cable. The wires are retained to maintain strength and flatness in the cable when the antenna is erected.

Feeding the Antenna

Depending upon how and where this antenna will be used, the center insulator attaching to the two halves at the feedpoint can be anything from a piece of string, a coat button, or even a standard ceramic or plastic antenna insulator. The transmission line for the antenna can be made of speaker wire with a clear insulation, alarm or intercom twisted pairs, the remaining, unused length of cable still on the reel, or you can use RG-8X or RG-174/U coax.

Radio Shack has a two-conductor speaker wire with clear insulation (RS 278-1301) in 50-foot rolls for $2.99. They also sell two-conductor twisted pair alarm wire (278-860) in 100-foot rolls for $5.99. However, making your transmission line from the remaining cable is cheaper, and will be less visible in indoor installations.

Making the Transmission Line

If you wish to make the transmission line from the remaining length of seven-wire cable, strip the needed length of three adjacent wires from the remaining four wires so you have two pieces of cable. The one you will use is the three-wire section.

Separate all three wires at one end of the transmission line and remove the insulation from the two outer wires for about 2 inches, depending on the length of the center insulator used at the feedpoint of the antenna. Now cut off and discard the short length of the center wire.

Only the two stripped outer wires will be used for the transmission line. They approximate a 72Ω line. The unused center wire maintains the constant spacing and provides additional strength to the transmission line.

Connect the stripped bare wires at the end of the transmission line to the bare ends of the antenna halves at the feedpoint. Solder both connections.

Prepare the other end of the transmission line in the same way, again removing the unneeded short length of the center wire. Now, solder the ends of the transmission line to an RF connector which matches the output connector on your transceiver or antenna tuner.

Erecting the Antenna

You'll find this antenna to be extremely portable. It rolls up into a nice compact package. When operating outdoors just find some cooperative trees to support the antenna and you're on-the-air.

The following are some hints for indoor installations in a motel room, apartment or condo.

The best and most inconspicuous place to mount the antenna is on the longest wall available, centered, or with the feedpoint at one corner to form a vee shape, which will give slight directivity. Whichever method is used, the antenna should be snugged up against the ceiling. The red 40 meter wire should be at the upper edge of the cable, making it less obvious. Because adults very seldom look above their own eye level, few visitors, including landlords and building managers, would even suspect the existence of your antenna. And, if you use white or clear glass or plastic coat buttons as a center insulator, your antenna will, for all practical purposes, be invisible.

Attach the antenna to the wall with office staples. They are wide enough to span the width of the cable without penetrating it. If you use thumb tacks, be sure that the metal tack does not short the actual antenna wires. If neither is available and you are in a hurry, cellophane tape used generously will probably hold the antenna up for a while. However you mount the antenna, it will be easy to strip it from the wall later. Pulling it loose will leave only tiny invisible holes as evidence.

As much as possible of the central portion of the dipole should be horizontal, but bending the ends to fit the available space will not greatly affect the operating efficiency of the antenna as long as the ends are not bent back parallel with the horizontal portion. Considering the height of the ceiling in most indoor locations, this antenna can also be used as a vertical-horizontal L-antenna, especially on 15 through 10 meters (see Figure 3). Simply tack the feedpoint in one corner of the room, roll out the horizontal leg along one wall, and tack the vertical portion at the top of the wall, and also on the ceiling if the end must be bent because of low ceiling height.

If you do not need 40 and 30 meter capability, you can shorten this antenna considerably, making it much easier to install indoors. However, it is not necessary to remove the 30 and 40 meter wires. This antenna provides full-size dipoles on all seven bands, whether you use them or not.

Performance

This antenna is not as efficient as 50-foot high individual dipoles erected outside. However, it will give a good performance in operation on all seven of the ham bands for which it is designed.

If an SWR of about 1.5:1 is acceptable—most modern transceivers will operate successfully into this high an SWR—you won't need an antenna tuner, but if there's one available you'll probably want to use it.

The transmission line will probably radiate some of the power supplied to the antenna. So what? Radiated RF goes somewhere, and it may well fill out a "blind spot" and result in contacts otherwise missed.

A dipole is not an especially directional antenna. This is particularly true when the dipole is either fairly close to ground or installed in the vicinity of hidden wires and pipes in indoor or outdoor walls of a motel room or apartment. These elements distort the free space doughnut radiation pattern shown in antenna literature. But, this project will give you a simple and effective seven-ham-band multiple dipole which is easy to build, install and use, light and portable, and at a cost of only $5, is within the budget of probably every ham. 73

Contact J. Frank Brumbaugh KB4ZGC at 82 Liddell Street, Buffalo NY 14212-1824.

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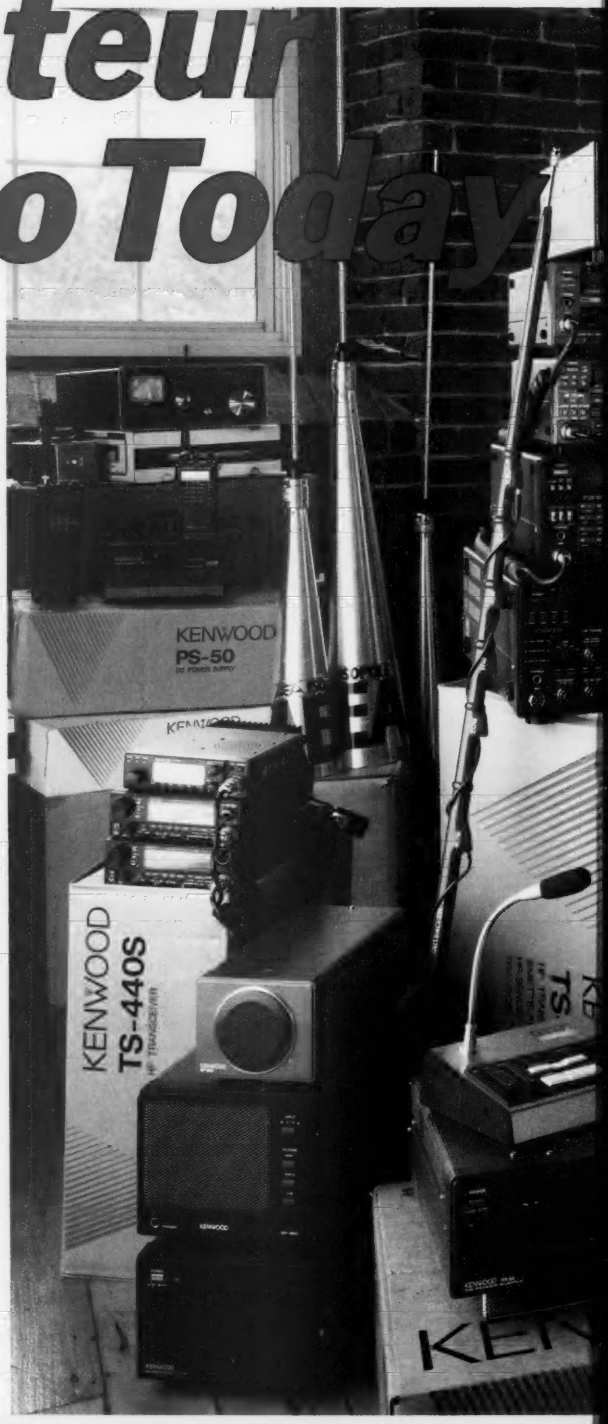

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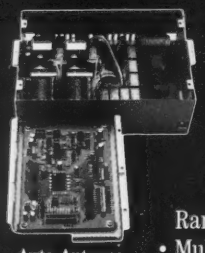

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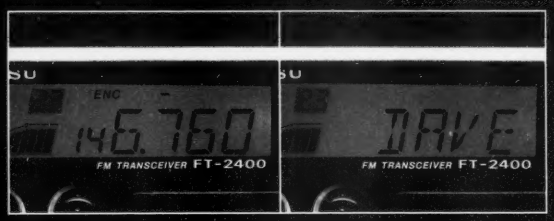

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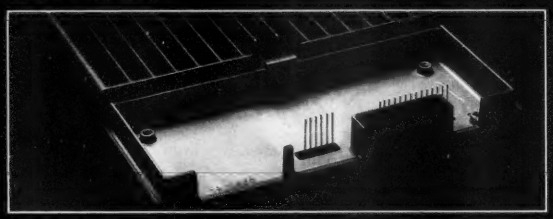

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Ten for 10

Build a high performance, 10 meter beam for $10.

by Michael Harris KM4UL

I have always enjoyed home-brewing ham radio equipment, and especially antenna projects, because the components are relatively inexpensive and the results are tangible. My wife says that I build and tinker more than I operate. Guilty as charged!

This article is a result of my tinkering, providing a practical example of constructing an X-beam for 10 meters. The antenna uses components commonly available in hardware stores, but it's also very inexpensive even if you have to buy all the materials. I purchased the primary components at my local hardware store for less than ten dollars.

I got into this project because I couldn't establish a schedule with Robin N7NHF in Idaho. His vertical and my delta loop weren't reliably making the trip. After discussing the matter, we decided we needed to improve our antenna situation.

Robin had both an interest and local expertise with quads, so he began his project. I remembered an interesting article, "Designing X-Beams" by Brice Anderson W9PNE in *The ARRL Antenna Compendium, Volume 1*. This article also appears in *The ARRL Handbook*, 67th edition (1990), Chapter 32, "Designing X-beams." The X-beam promised good performance and appeared to be relatively easy to construct. The article discusses design, construction, and tuning in general, but does not focus on a particular design. I picked up the ball from there and the result is an operational X-beam, a regular schedule with Robin, and this article, an explanation of how to duplicate the antenna I built. It contains construction alternatives and hints on prototyping.

Performance

The design article claims gain figures of 6 dBd and a front-to-back ratio of 15–18 dB. What I noticed was an improvement from "headphone copy" to "solid copy" during my schedules with Robin. Good enough for me!

Several hams have mentioned reading "bad things" about X-beams, frequently referring to L.A. Moxon G6XN's *HF Antennas for All Locations*, Chapter 5, "X-Beams and Slopers." These "bad things" relate to getting an acceptable pattern and a characteristically low feedpoint impedance.

The general problem of X-beam patterns was solved in Brice's design by adding the tails. These effectively prevent side lobe radiation and provide a good pattern.

Photo A. The completed X-beam.

The problem of low feedpoint impedances is common to all antennas with close-spaced elements—including yagis. The antenna exhibits a feedpoint impedance of approximately 10 ohms. This is easily matched by techniques commonly used to feed yagi antennas. I used a "Collins balun" as described by George Badger W6TC in "A New Class of Coaxial Line Transformers," *Ham Radio Magazine*, February 1980, Part 1; and Part 2, March 1980. I describe construction of a suitable transformer in this article. I highly recommend this class of coaxial baluns for all antenna work.

I have performed extensive computer modeling of this antenna using MININEC3 (J.C. Logan and J.W. Rockway, *The New MININEC, Version 3: A Mini-Numerical Electromagnetic Code*, NOSC Technical Document 938, National Technical Information Service, 1986). This modeling confirms the gain figures reported by Brice, the effectiveness of the tails, and the feedpoint impedances. The general predictions of the computer modeling have been confirmed by antenna measurements and in-service observations.

Materials

I enjoy reading articles about how somebody built this or that with some exotic material or tool they just happened to have around,

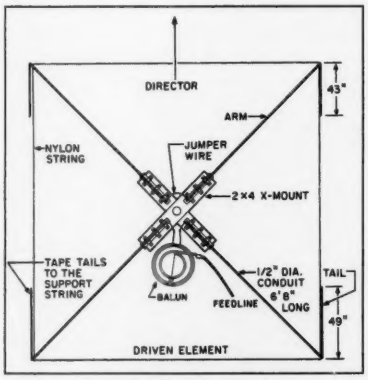

Figure 1. X-beam overview.

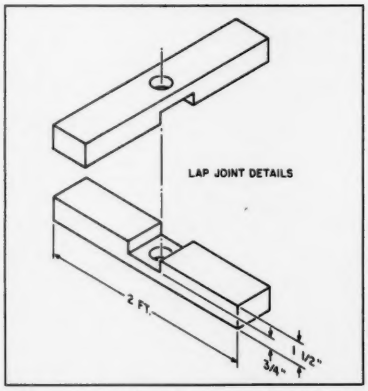

Figure 2. Lap joint for assembly of the X-mount.

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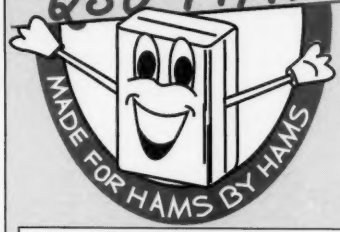

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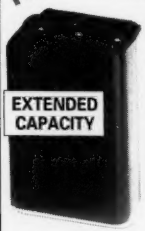

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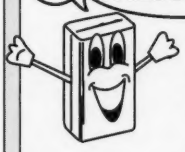

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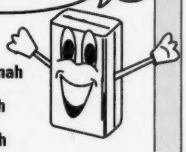

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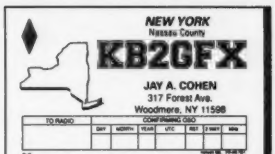

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but I've never been that fortunate. Fear not—this antenna can be readily constructed using common materials such as wood, steel conduit, and PVC pipe.

I bought the conduit, the PVC pipe, the pipe clamps, and the two-by-fours for less than ten dollars. The miscellaneous hardware alone, if purchased, should cost only a few dollars.

Antenna Components and Construction

The electrical components of the antenna consist of four tubular arms with a wire tail attached to the end of each one. Two arm assemblies are connected and tuned to form a director element; the other two are tuned and form the driven element.

The mechanical components of the antenna consist of a small X-hub in the center, along with a cord which strings the arms together. The hub supports the radially configured arms, and the cord supports the tails in the same plane as the arms. The electrical components of the coaxial transformer consist of six 50″ pieces of 50 ohm coax.

The Hub

I built my hub with two 2′ pressure-treated two-by-fours. Join them at the center with a lap joint (see Figure 2). Cut the lap joint with a saw and chisel or with a dado blade. Join the pieces with screws and epoxy or waterproof resin glue. Cut a hole in the center to accommodate the mast.

As an alternative, especially for prototyping, substitute a piece of plywood for the two-by-fours. Use exterior plywood and varnish it. I chose the two-by-fours so that the hub wouldn't ice up as much.

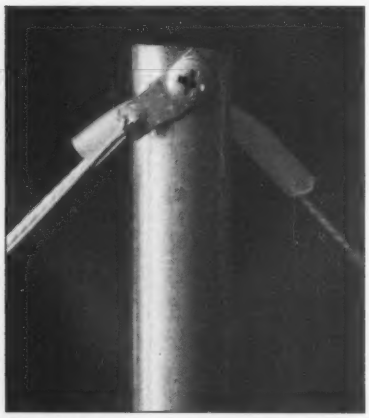

Photo B. Tail attachment and support method. Note the use of silicon tubing to protect the tail support cord.

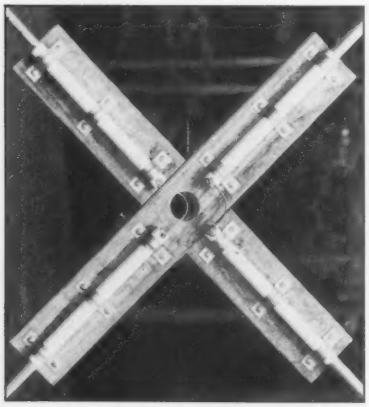

Photo C. The completed hub assembly of the antenna, prior to installation.

The Arms

My local hardware stores don't carry 6061-T6 aluminum, but they stock a nice selection of steel conduit. For this antenna, the steel conduit is an acceptable substitute. The ½″ size is close enough to the 200-to-1 length-to-diameter ratio specified in the design article.

Buy four 10′ lengths of ½″ EMT conduit. Cut each piece to 6′11″ with a hacksaw. Clamp the conduit to your workbench and drill a vertical hole at each end to accept the electrical connections.

The Tails

My installed antenna uses #19 AWG stranded hookup wire for the tails, but I've also used #12 AWG home-wire. The wire size will affect the length of the tails required to achieve resonance. The smaller the wire, the longer the tail. I prefer the larger, more solid wire as it remains straight even if the support cord shifts or stretches.

For a center frequency of 28.3 MHz, cut two director element tails, each 43″ long, and two driven element tails, each 49″ long. These lengths provide about 2″ extra for tuning if #19 AWG wire is used. Solder a wire terminal to one end of each wire.

The most important consideration is to always maintain a difference of 6″ between the driven and the director tail element lengths. Using two different colored wires for the driven and director element tails can help to reduce confusion later.

The Tail Supports

The tails must be supported in the same plane as the arms. I used 3/32″ nylon cord threaded through holes drilled in the end of each arm. I used silicon tubing to provide strain relief for the cord.

Put the tail support holes 90 degrees and ½″ in from the hole drilled for the electrical connection. This inset prevents the nut and bolt from touching and rubbing through the tubing.

Drill the tail support holes at one end of each arm using a ¼″ drill bit. De-burr the holes with a piece of emery cloth. Cut four 2″ pieces of silicone tubing and set them aside. Do not install the tubing until after the arms are insulated and installed. Silicone tubing is sold at aquarium shops as airline tubing, and at hobby shops as fuel tubing. Dacron™ or Kevlar cords are preferable, as they weather well and won't stretch as much as nylon.

Insulating the Arms

The arms should be insulated from the hub for consistent performance. I used ½″ type SDR PVC pipe (not schedule 40). It provides a good, albeit tight, fit around ½″ EMT conduit.

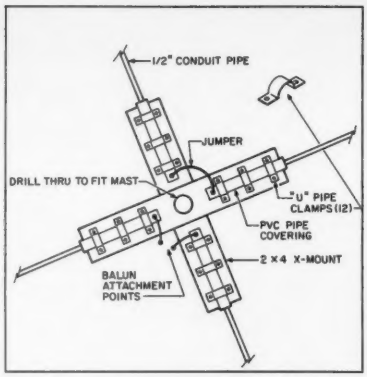

Figure 3. X-mount construction details.

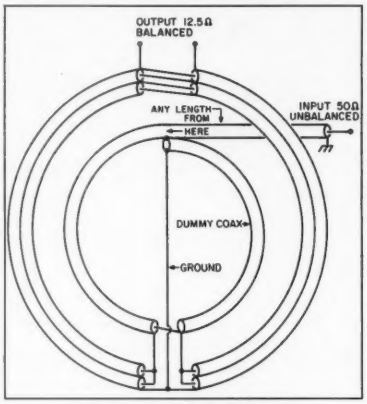

Figure 4. Collins balun.

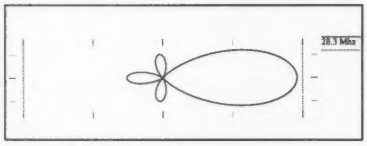

Figure 5. X-beam pattern.

Cut four 11″ lengths. The fit is very tight, so use warm soapy water as a lubricant. Start a length of PVC over the inside end of the arm. Install it fully by repeatedly driving it against a concrete floor. Repeat this procedure for the remaining arms. Substantial force can be used without damaging the PVC. Sanding the conduit may help, but be careful not to sand through the zinc coating.

Open up the electrical connection holes you drilled by cutting away some of the PVC. I used a ⅜″ spade wood bit in my drill to shave it away. You can use a knife, but the PVC is difficult to cut.

Building the Coaxial Balun

This Collins coaxial balun consists of two stages. The first stage matches 50 ohms unbalanced to 50 ohms balanced; the second matches 50 ohms balanced to 12.5 ohms balanced. Use a compact low-loss coaxial cable such as RG-8X—this balun is bulky.

Build each stage separately, then solder them together in series. To prevent confusion

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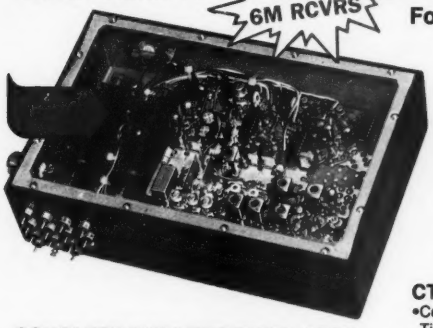

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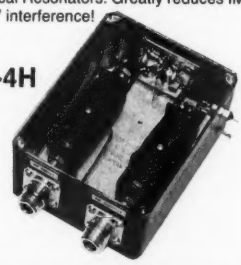

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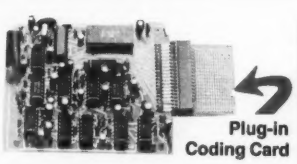

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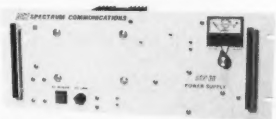

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- Massive 30 lb. Transformer & Heat Sinks.
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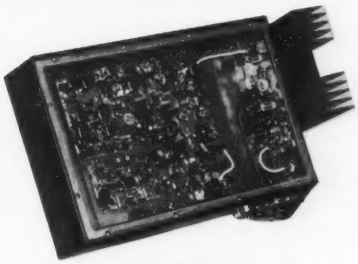

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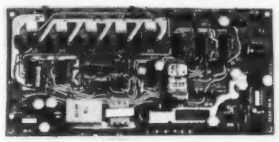

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later, mark the ends of the lengths of coax before you begin winding them. Keep the interconnections short. Use the coaxial braid at the 12.5 ohm output to connect directly to the antenna feedpoints.

Figure 4 shows the interconnections and layout as if the balun wasn't coiled. In practice, the lengths are wound into a coil with a diameter of six or seven inches. This diameter isn't extremely critical; it depends on the coaxial cable you use. The ground wire should be short, but its length isn't critical, either. The dummy length of coax in the input stage can be replaced with a wire, provided it is the same length (50″), and is wound in the same manner.

Use electrical tape to hold the windings together—sparingly during construction, and with a vengeance prior to installation. Waterproof the balun by using a polyurethane spray or a silicone rubber compound.

Putting it Together

Prepare the hub. (Refer to Figure 1 and Photos B and C for detailed views.) Start by marking a centerline on each two-by-four. Next, place the pipe clamps. I used three pipe clamps per arm: one at each end, and one in the middle. Be sure to use the proper type of clamps—½″ electrical clamps for clamping conduit directly, and ½″ plumbing clamps for clamping the insulated arms. Locate the inner edge of each innermost clamp 1¾″ from the center to provide clearance for the mast. Drill pilot holes for the clamp screws. Install the clamps loosely.

Install the arms by slipping each arm, in turn, under the clamps, then snugging the clamps. Allow the inner end of each arm to extend ½″ beyond the edge of the inside clamp. This provides access to the end of the arm for electrical connections. Clamping the hub to a workbench or your deck reduces the number of hands required for this procedure. Rotate each arm to properly align the electrical and tail support holes, then tighten the clamps securely.

Next, attach each tail loosely to the arm. If possible, use stainless hardware. Be sure to install the director element and driven element tails properly. This step is best performed before you install the tail support tubing.

To support the tails, install a 2″ piece of silicone tubing through the hole at the end of each arm. Thread the tail support cord through each arm in turn. Pull the cord tightly, as it will sag when the tails are attached. Line the tails up along the cord and secure them at several points with electrical tape. Tighten the tail-to-arm connections securely.

To wrap it up, connect the director element arms. I used a short piece of #12 AWG copper wire. Coax braid will also work well.

Feeding the Antenna

The feedpoint impedance of this antenna is 10 ohms at resonance. With proper matching to 50 ohm coaxial lines, this antenna provides a 2:1 VSWR bandwidth of about 600 kHz on 10 meters.

For my prototype antenna I used a coaxial "choke" balun consisting of 10 turns of coaxial cable wound into a 6″ diameter loop. I matched the transceiver to the line using a transmatch.

For my installed antenna I used the two-stage Collins balun described in this article. This balun provides a 12.5 ohm balanced to 50 ohm unbalanced transformation. A 2:1 VSWR bandwidth of 600 kHz is exhibited without the use of a transmatch.

I strongly suggest the use of a balun, and I heartily recommend the Collins class of baluns, but the coil-of-coax type will work in a pinch.

Tune-Up

Install the beam on your test tower. I used an 8′ wooden ladder for my test tower. It's high enough off the ground, yet access to the tails is convenient.

Tune-up is accomplished by trimming the tails. Be sure to keep the director element tails and the driven element tails the same lengths, respectively. Also, be sure to maintain a difference in length of 6″ between the director element tails and the driven element tails.

Use a dip meter, noise bridge, or SWR meter to test for resonance. I borrowed a dip meter for the tune-up procedure. If you use a dip meter, be sure you are familiar with its limitations. During my tests, I found that the antenna was resonant at a frequency 5% higher than that indicated by the dip meter.

Proceed by trimming the tails ½″ at a time, testing for resonance until the correct resonance is achieved. Note that the antenna is fairly sensitive to nearby objects, such as your body.

Perform the final tune-up with the antenna installed. I ended up with director element tail lengths of 41″, and driven element tail lengths of 47″, for a resonance at 28.3 MHz.

Prototyping

This is a very easy antenna to prototype. The difference between my prototype and the installed antenna was about $3, plus an hour of labor.

I prototyped mine by directly clamping the conduit to a scrap piece of wood. I attached the wire tails with ground wire clips, supported the tails by taping them to a cord drawn around the perimeter, and made the connections at the hub by clamping the wires under the pipe clamps. I completed my "installation" by clamping it to an 8′ wooden ladder in my living room.

Installation

I installed the beam at the base of the top section of my 36′ push-up mast, inverting the beam and attaching it to the underside of the guy ring. I had to do this to prevent mechanical interference between the hub and the clamp for the top mast section. I did not have to worry about interfering with guy wires, as my mast is not guyed. The mast's sheltered location, light antenna load, and mechanical attachment to the house, precluded the need for guy wires.

To prevent rotation about the mast, I fashioned two L-shaped pieces of plumber's metal strapping and screwed them to the guy ring. I secured the assembly to the mast with a hose clamp. This is adequate for me, as I don't have a rotor, and I am using the antenna for fixed direction schedule work. As an alternative, especially if you are using a rotator, use a heavy-duty L-bracket with pipe clamps that fit your mast.

Complete the installation by securing the balun to the mast. I wound electrical tape through each stage of the balun, and around the feedline below the balun.

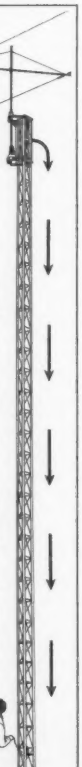
I'm confident that you'll find this to be a compact, high performance beam which is easy to build and won't lighten your pocket book. Enjoy it! Be sure to remember that "59" means "armchair copy" and "20 over 9" means "You woke up the kids." You'll be hearing this new jargon often! 73

Contact Michael Harris KM4UL at 5917 Crabapple Rd., Durham NC 27712.

Parts List

4	10′ lengths of ½″ EMT conduit
1	10′ length of ½″ SDR PVC pipe
12	½″ plumbing pipe clamps
1	8″ length of silicon tubing
4	4′ lengths of wire scraps
2	24″ lengths of pressure-treated two-by-four
6	50″ lengths of coax (RG-8X preferable)
	Misc. Hardware as required

Enjoy NEVER CLIMBING YOUR TOWER AGAIN



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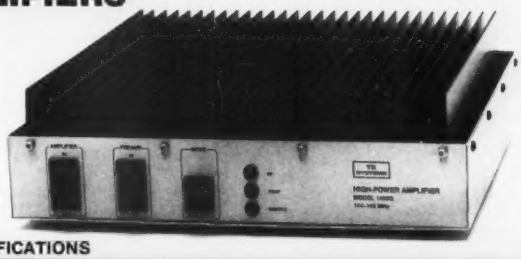

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SPECIFICATIONS

Model	Freq. MHz	Power Input	Power Output	Preamp NF-dB	Preamp Gain-dB	DC +Vdc	Power A	RF Conn.
0550G	50-54	10	400	.6	15	13.6	60	UHF
0552G	50-54	25	400	.6	15	13.6	55	UHF
1450G	144-148	10	400	.6	15	13.6	54	UHF
1452G	144-148	25	400	.6	15	13.6	50	UHF
2252G	220-225	25	220	.7	14	13.6	36	UHF
4450G	420-450	10	175	1.1	12	13.6	34	N
4452G	420-450	25	175	1.1	12	13.6	29	N

Models also available without GaAs FET preamp (delete G suffix on model #). All units cover full amateur band – specify 10 MHz bandwidth for 420-450 MHz amplifier. Continuous duty repeater amps also available.

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CN-101 "PEP"	1.8-150 MHz	15/150 W/1.5 kW	SO-239 (M)
CN-103 "	140-525 MHz	20/200 W	M or N type
DP-810 "Digital"	1.8-150 MHz	0-1.5 kW	M type
DP-820 "	140-525 MHz	0-150 W	N type
DP-830 "	1.8-525 MHz	0-1.5 kW/0-15 W	N type
NS-660A/PA	1.8-150 MHz	30/300 W/3 kW	M type
NS-663BM/BN*	140-525 MHz	30/300 W	M or N type

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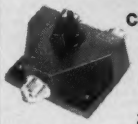
Input Voltage	117 V AC ±10%
Output Voltage	13.5 V
Output Current	12 A
Volt. Fluctuation	Less Than 1%
Ripple Voltage	Less Than 3 mV
Protection Circuit	14.2 A
Pwr Consumption	350 W max.
Dimensions	5 × 4 × 8 in.
Weight	11 lbs.



CS-201

Other Models: PS304, PS120M, RS308D, RS40X

Coaxial Switches

	CS-201 2 Position	CS-201G II 2 Position	CS-401 4 Position	CS-401G 4 Position
Frequency:	500 MHz	1.3 GHz	800 MHz	800 MHz
Connectors:	SO-239	N type	SO-239	N type
Isolation:	+60 dB	+60 dB	+50 dB	+50 dB
Power Rating:	2.5 kW PEP 1 kW CW	2.5 kW PEP 1 kW CW	2.5 kW PEP 1 kW CW	2.5 kW PEP 1 kW CW

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CN-460M*	140-450 MHz	15/150 W	SO-239
CN-465M*	140-450 MHz	15/75 W	SO-239
CN-520**	1.8-60 MHz	200 W/2 Kw	SO-239

*Back lit with mobile bracket
**Optional mobile bracket available

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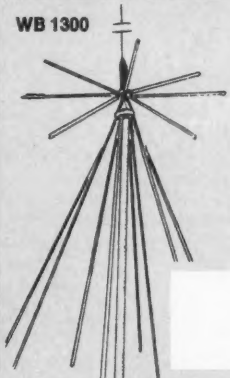
WB 1300



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A Family Affair

"How can I get my own children interested in ham radio?" is the second most-frequently asked question. You've probably guessed that the most popular query is still, "How can I get my wife to become a ham?" Let's address the offspring problem in this column now. We'll save the spousal issue for another time.

Helping parents and children work together on any project is a worthwhile endeavor. Throughout the last 10 years of teaching ham radio, I've always encouraged the youngsters to study at home with their parents. The parents love the idea of learning new material along with their children. Here at last is a subject where parents and children can be on equal footing with each other. It's a chance for real active participation in their children's academic lives. Most parents are quick to see the benefits of encouraging their youngsters to get involved with a technical and stimulating hobby.

In order to motivate the 6th, 7th, and 8th graders in my "Introduction to Amateur Radio" classes to include their parents in their own quest for a license, I tell them to "study at home with the person who has the money. If your mom or dad gets a license too, they'll probably buy ham radio equipment for your family to use." The kids love the idea that they're putting something over on their folks. Years later, when I get the siblings of these children in my class, they come back with their parents during Open School Week to tell me how much ham radio has contributed to the quality of their family-time together. The burden then falls to the young sibling in my class to carry on the family tradition. I've gotten enough positive feedback about the fun that ham families have, that I make it a point to encourage it whenever possible.

Getting back to the original question, many hams have written to me over the years, perplexed at why their own youngsters don't seem to share their love of amateur radio. Of course, those of us who are parents know all too well that sometimes the more we encourage, cajole, or bribe our kids to do something that we'd like them to do, the more they pull away from it. Some degree of rebellion is a natural part of growing up. Children have a need to assert themselves and establish their own identity. Much to our chagrin, at times this means rejecting whatever mom and dad may consider a real good idea.

Through the trials and tribulations of child rearing, there are many proud and happy moments that help counter the negatives. Keeping all this in mind, the best advice to a ham parent is not to use overkill when attempting to convince your children to become hams. Just be yourself and let the youngsters see you enjoying your time on the radio. Enjoyment and enthusiasm tend to be contagious. Never underestimate the vibes that children pick up as they watch you having fun and being challenged by your radio activities. There's a time when the smile of satisfaction or the expression of excitement on your face says a lot more than any words you can say.

Among the countless benefits I've experienced in my role as a ham radio teacher has been the privilege of having children of hams in my class. Don't think for one minute that these parents had an easy time of it. Not one of the nine youngsters in this category were licensed when they were assigned to my class. That should tell you something right there. Another statistic is that they all became licensed at the end of the program. There are simply times when an eleven-year-old thinks it's OK to do something because their peers are all doing it, not because a parent would be overjoyed to have them do it.

The following are stories of some boys and girls whose parents were ready to move heaven and earth to get them involved in ham radio. They wound up in my ham radio program which provided them with the opportunity to be in a class with other children who were eager to get a ham ticket. Working and having fun with other teens was just the extra motivation these kids needed. Before we knew it, they were going home and proudly reporting their new-found radio experiences to their ham parents. At first the dads were surprised that the children acted as if it were their first exposure to ham radio. Then they realized that this was just the kids' way of asserting their separateness. Smart parents should listen attentively to their children's reactions and anecdotes. Encourage them to tell you about their experiences with the other students. We all need to feel we have something unique to offer our families.

So, getting your offspring enrolled in a local ham radio class in a school or club is a great idea. Don't ever assume there's a genetic predisposition to becoming a ham. Set the stage with your own enthusiasm and then encourage them to go with a friend to a structured class. You've already planted the seeds; now sit back and let nature take its course—with the help of an objective, good ham radio instructor.

Gerald D. Fox, D.D.S., WA2VKS

"One hundred baby chicks!" That's what the man said. I was 12 years old; it was late at night in 1960, and I was lying in bed listening to WWVA on the radio, all the way from West Virginia. The commercial on the radio reminded me of how different life in other parts of the country must be from my life in New York. What would a city boy do with a hundred baby chicks?

Photo A. Jerry Fox WA2VKS visits his daughter, Loren KA2JNV, at the school ham shack.

That summer, I went to my friend Larry's house to sleep over. Larry reached under his bed and pulled out a shortwave radio. Voices from other lands speaking many languages filled my ears. Larry tuned around the dial and suddenly the voices sounded different. I wasn't hearing polished, professional broadcasting. This was conversation. These people were talking to each other. Then I heard a British accent; people were talking across the ocean! I was hooked.

The next summer I went to a camp, and I was delighted to discover a new activity. The camp had a ham shack, complete with a Gonset "gooney box." Myles, the counselor, taught me code and theory, and that summer I passed my Novice test.

Ham radio has stayed in my blood. I worked my way up the ladder, getting each class of license, including amateur Extra. It was time to pass it on!

I now have a 12-year-old daughter attending Intermediate School 72 in Staten Island, New York. You can imagine how thrilled I was when I found out that they had a ham radio program. I met Carole Perry, the instructor, whom I'd spoken to many times on 2 meters. I knew my daughter would have to take this course!

Carole made it fun. Loren called me at work each day and told me what she'd learned. Hearing of her progress almost made me cry. The class has both an HF and VHF setup, and I had the pleasure of talking to Loren in class via the local repeater.

Loren did get her Novice license after studying in Carole's class. She is still a little mike shy, but she told me today she'd like to get some practice on the air. You know, I loved it!

Shaun Gartenberg KB2JNW

I am a 13-year-old amateur radio operator. Both of my parents are hams as well. My father, Martin Gartenberg WA2YYX, has been a ham radio operator for about 30 years. He was introduced to the hobby at an early age by a friend. He holds a Technician class license, and is active in several Staten Island radio clubs. He was also president of the Chaverim Radio Club in Perth Amboy, New Jersey. He's been good friends with Mrs. Perry for over eight years. He was always telling me how much fun it would be to get into her ham radio program when I went to Intermediate School 72. He was right!

My mother, Rachelle Gartenberg KB2DBF, has been a ham for two years. She was introduced to the hobby by my father who helped her study for the Novice license. She is a schoolteacher who plans to upgrade in the near future.

Photo B. The Gartenbergs, left to right: Marty WA2YYX, Shaun KB2JNW, and Rachelle KB2DBF. (Photo by Jay Gerstel KA2CUS.)

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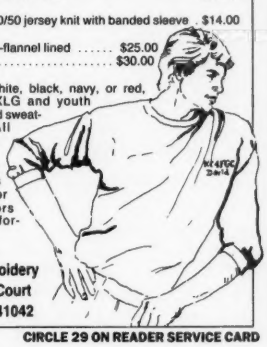

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CIRCLE 132 ON READER SERVICE CARD

Photo C. The Tropps: Charles N2CDV, Laura KA2WUH (in the middle), and Deborah KB2KXU.

Photo D. Lori Perry KA2TCC and Carole Perry WB2MGP.

I became a ham in January 1990, and I love it. It's an interesting and exciting hobby. I was in Mrs. Perry's radio class when I was in the 7th grade. It was here I found out how much fun my friends and I could have in ham radio. I'm a Novice now, but I'm studying for my upgrade. This year as an 8th grader, I'm in Mrs. Perry's homeroom class. Many of the other students in this class are hams, too. It's great in the morning when we're in homeroom. We're right near the ham shack. Not only is it fun to talk on the air in the morning from school, but in my case, it's great because I can talk to my dad. He's so proud of me.

I have a 9-year-old sister named Meredith. She's not a ham yet, but my parents and I are sure she will be in the future.

Charles Tropp KA2AHA

Although interested in ham radio since grade school, I didn't get my first license with callsign KA2AHA until 1978, after completing an adult education course at Susan Wagner High School. I started operating in the spring of 1979, and I got my General license as N2CDV in 1980. Laura KA2WUH received her Novice license as a student of Mrs. Carole Perry in 1985 at I.S. 72 on Staten Island. Deborah KB2KXU got her Novice license in 1990 also at I.S. 72. Our station consists of an ICOM 751 and a dipole at 40 feet. We also have 10 meter FM capability, and we can operate on all HF bands. We enjoy being a ham family.

Lori Perry KA2TCC

My name is Lori Perry, callsign KA2TCC, and I'm 20 years old. Nine years ago I attended Intermediate School 72 where my mother taught a ham radio course. At first I was mortified to learn that several of my friends were going to be in my mother's class. For years, my mother tried to get me involved with her hobby. Actually, it wasn't until my friends started talking about it that I began to consider it seriously.

Today I'm a communications major at Hofstra University. Ham radio has been influential for me from the moment I went for my entrance interview, to my present choice of media courses. The woman who interviewed me spotted an HT antenna sticking out of my bag and asked about it. In retrospect, it was obvious that she was impressed.

I haven't been very active in the last few years, but I am very pleased and proud to be a ham. There have been many family activities, like vacations and trips, where it was really nice to have a ham for a mom. 73

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SPECIAL EVENTS

Ham Doings Around the World

Listings are free of charge as space permits. Please send us your Special Event two months in advance of the issue you want it to appear in. For example, if you want it to appear in the January issue, we should receive it by October 31. Provide a clear, concise summary of the essential details about your Special Event. Check /HAMFESTS on our BBS (603–525–4438) for listings that were too late to get into publication.

APRIL

CAMILLUS, NY VE Exams will be held the first Friday of each month at the Town of Camillus Municipal Building, 4600 W. Genesee St., Camillus NY, beginning at 7 PM. Test fee for Technician through Extra Class is $5.25. Talk-in on 147.300. Contact *John Patchett KB2ERJ, (315) 487–0298.* Please bring two forms of ID and a copy of your license.

APR 6

ROCHESTER, MN The 14th annual Rochester Area Hamfest/Computer/Electronic Show, sponsored by the Rochester ARC, Inc., will begin at 8:30 AM. Tables are $8 in advance, $9 at the door. Set-up Fri., Apr. 5th from 4:30–7:30 PM and Sat. from 6:30–8 AM. Contact *John Scott NØHZN, (507) 285–9236.* Send check and SASE to *R.A.R.C., c/o NØHZN, 2824 NW 24th St., Rochester MN 55901.*

COLUMBUS, IN The Columbus ARC will sponsor a Hamfest at the Bartholomew County 4-H Fair Grounds Women's Building from 8 AM–2 PM. Set-up Fri., Apr. 5th from 6–10 PM and Sat. from 6 AM. Admission $3. Tables 8'/$6. Talk-in on 146.790/146.90. For reservations: *Marion Winterberg, 11941 W. Sawmill Rd., Columbus IN 47201, (812) 342–4670.*

APR 6-7

SPOKANE, WA The 14th annual Inland Empire HamFest/Eastern Washington Section Hamfest will be held at the Spokane Youth Sports Bingo Hall from 9 AM–5 PM Sat. and Sun. Set-up Fri., Apr. 5th from 1 PM–6 PM. On site breakfast starting at 6:30 AM. Admission $5 for both days. Children under 12 free. License Exams Sat. beginning at 1 PM. Sat. night Awards Dinner ($9.15 per person) 7 PM at the Town & Country Restaurant. Swap tables: $10/8', $8/6'. Table registration deadline is Apr. 1st. Make check payable to: *I.E. Hamfest, S. 1405 Crestline, Spokane WA 99203.* For info call *(509) 534–8443.*

MOORELAND, OK The Great Plains ARC will host the annual N.W. Oklahoma Eyeball and Swapmeet at the Mooreland Agricultural Bldg., beginning at 12 noon Apr. 6th, and at 9 AM Apr. 7th. Admission $3 for both days. Basket Dinner at 12 noon Apr. 7th at no charge. Free dealer and swap tables. Talk-in: 147.12/.72 or 146.13/.73 and 146.52 simplex. Contact *Gerald Bowman WG5Z, Box 356 Mooreland OK 73852. (405) 994–5453 or Bob Bayless, (405) 254–3561.*

APR 7

ST. JOSEPH, MI The Blossomland ARA will sponsor a Hamfest beginning at 8 AM at the Berrien County Sportsman's Club (take I-94 to Exit 28, south on US 33 for 6½ miles to Linco Rd. and turn left to end of road). Set-up at 6 AM. Handicap access. Free parking. Tickets $3 in advance, $4 at the door. Reserved tables $4, $5 at the door. Registration deadline Mar. 25th. Talk-in: 145.47 and 146.82. Send SASE to *BARA, PO Box 175, St. Joseph MI 49085.*

APR 12–14

VISALIA, CA The Northern California DX Club will host the 42nd International DX Convention at the Holiday Inn Hotel beginning Fri., Apr. 12th at 1600 local time. Fri. night Bar-B-Que and Sat. Banquet will be preceded by cocktail parties, with breakfast at 0800 Sun. Preregistration is $45 US before Mar. 15th, $50 at the door. Includes banquet, breakfast and all programs/exhibits. Contact *General Chairman E.D. Stephenson W6MKM, 230 W. 42nd Ave., San Mateo CA 94403. (415) 341–0757.*

APR 13

LEBANON, PA The Appalachian Amateur Repeater Group will sponsor the Annual AARG Hamfest/Computer Show at the Lebanon Fairgrounds beginning at 8 AM. Admission $4, (XYL's, YL's and kids free). Set-up at 6 AM. Handicap accessible. VE Exams at 10 AM (be there by 9:30 AM). Lateness results in disqualification. Tailgating, $3/space. Indoor tables $8. Talk-in: 146.04/.64 and 146.52/.52. Make registrations payable to AARG and mail to *AARG, Ron Wiggins WB3HNX, R.D. #4, Box 374, Pine Grove PA 17963.* Contact *Ron WB3HNX, (717) 345–8667; Homer WA3YMU, (717) 345–3780; Willie KA3MVM, (717) 273–6334.*

LAWTON, OK The Lawton-Fort Sill ARC will hold their 44th annual Hamfest at the County Fairgrounds from 8 AM–5 PM. No preregistration necessary except for table space. Talk-in on 146.91/.31. Contact *Bob Morford, 1415 NW 33rd, Lawton OK 73505. (405) 355–6120.*

CHESAPEAKE, VA The Chesapeake ARS will host a Hamfest at the Indian River Recreation Community Center from 9 AM–3 PM. Wheelchair accessible. VE Exams sponsored by the Chesapeake DX Assn. ARES Forum. Admission $3. All tables $5. Set-up Fri. Apr. 12th from 6 PM–9 PM. Dealer contact *Frank KN4QG, (804) 588–0403 or Chuck N4NIG, (804) 482–0842.* Flea Market contact *Rob N4SFH, (804) 487–1896 before 10 PM.* Reservation deadline Apr. 1st.

FERGUS FALLS, MN The Lake Region ARC will sponsor their 4th annual Hamfest from 8 AM–3 PM at the Otter Tail County Fairgrounds Hockey Arena. Set-up Fri. the 12th at 4 PM. Security provided Fri. night. Camping spots for Fri. night only. Tickets $3 in advance, $4 at the door. Tables $4/6'. Reservation deadline Apr. 1st. VE Exams start at 9 AM for Novice to Extra. Send 610 form, copy of original license, or all current completion certificates, and check for $5.25 made payable to ARRL/VEC, to *Tom Shubitz, Box 157, Fergus Falls MN 56537.* First come first served walk-ins. Contact *Keith McKay NØFKF, RT 1 Box 46, Battle Lake MN 56515. (218) 826–6274.*

APR 13-14

ABILENE, TX The Key City ARC will sponsor the ARRL West Texas Section Convention & KCARC Hamfest at the Downtown Abilene Civic Center Sat. from 8 AM–5 PM, and Sun. from 9 AM–4 PM. Set-up 6 PM–10 PM Fri. There will be an easy Ham Breakfast at the headquarters motel from 6 AM–9 AM. Dial *1–800–588–0222* for room reservations at the Quality Inn. Tables $2, free electricity. VE Exams, walk-ins okay. Tickets $5 in advance, $6 at the door. Registration deadline is Apr. 11th. Make check payable to KCARC and send with SASE to *KCARC, PO Box 2722, Abilene TX 79604.* Contact *Bill Jones N5DOX, (915) 698–4606.*

APR 14

ROCKFORD, IL The Rockford ARA will sponsor the Rockford Amateur Radio/Computer Fair at the Forest Hills Lodge from 8 AM–3 PM. Free Parking. VE Exams. Wheelchair accessible. Tailgating. Tickets $3 in advance, $4 at the door. 8' table/2 chairs, $7 in advance, $10 at the door. Registration deadline is Apr. 1st. Send check and SASE to *Rockford ARA, 200 Westmoreland Ave., Rockford IL 61102.* Ticket/table/booth contact: *Al Gaines KA9VSZ, (815) 962–3910.* For info: *Joe Roling N9HEZ, (815) 399–6995.* Talk-in: 146.01/146.61 and 222.68/224.28 RARA repeaters.

FRAMINGHAM, MA The Framingham ARA Flea Market and Exams will be held at the North High School beginning at 10 AM. Admission is $2. Early bird admission at 9 AM, $5. Set-up 8 AM. 6' tables $12, paid in advance, includes one admission only. Code exams start at 11 AM, written exams given at 12:00. Send a completed FCC form 610, copy of current license, list of exams you plan to take and a check for $5.25, payable to ARRL/VEC to: *Dick Marshall WA1KUG, 37 Lyman Rd., Framingham MA 01701,* no later than Apr. 7th. Table contact: *Jon K1VVC, (508) 877–7166.* Exam info: *Dick WA1KUG, (508) 877–0563.*

RALEIGH, NC The Raleigh ARS RARSFEST '91 will be held from 8 AM–4 PM at the Jim Graham Bldg. of the NC State Fair Grounds. Free parking, RV's accommodated. Exams begin at 10 AM at the Holzhauser Bldg. Tickets $5 in advance, $6 at the door. Set-up at 12 noon Apr. 13th and from 6AM–8 AM Apr. 14th. Contact *Roland NF4P, 1421 Parks Village Rd., Zebulon NC 27597. (919) 269–4406.* For exams, contact *Vince AA4MY, (919) 847–8512.* Talk-in: 146.64/.04.

APR 2

BOWLING GREEN, KY The National Guard Armory will be the site of a Hamfest sponsored by the Kentucky Colonel's ARC. Doors open at 7:00. Contact *Denver Eadens N4WWA, (502) 777–3681,* or write to *K.C.A.R.C., PO Box 9781, Bowling Green KY 42102–9781.*

JOPLIN, MO The Joplin ARC will hold a Hamfest indoors at the National Guard Armory from 7 AM–3:30 PM. Tickets $2 in advance, $3 at the door. Tables $5. SASE/check to *Joplin ARC, c/o Larry Hendrix, 107 Hillview, Joplin MO 64804.* VE Exams, Fleamarket, Auction, 2M Rabbit Hunt. Talk-in: 147.21/147.81.

OTTAWA, ONT., CANADA The Ottawa Valley Mobile RC Inc. will sponsor a Flea Market from 0900–1600 EST at the Canterbury High School. Talk-in on 147.30/.90. Contact *Ken Barry VE3KJB, (613) 746–4823.*

APR 21

CLEVELAND, OH The North Coast ARC will hold their Spring Hamfest at the L.D.A. of Cuyahoga County, between 8 AM and 2 PM. Set-up at 6:30 AM. 8' tables $10 for the first, $8 each additional. For info, SASE to *Ron Nichols N8LZA, 5402 Velma Ave., Parma OH 44129. (216) 351–7787* after 6 PM.

SULLIVAN, IL The 28th annual Sullivan Hamfest, sponsored by the Moultrie AR Klub, will be indoors in four big barns. License Exams will be given from 9 AM–12 noon. Walk-ins accepted. A limited number of tables are available by reservation for $7.50 each. Tickets are $2 each or $5/3 in advance; $3 or $5/2 at the door. There is no set-up charge for the Flea Market. Contact *Ralph Zancha WC9V, 502 E. State St., Lovington IL 61937,* or call *(217) 873–5287 evenings.*

WELLESLEY, MA The Wellesley ARS will sponsor an Event at the Wellesley Sr. High School parking lot from 9 AM–2 PM. Handicap accessible. Admission $2. Talk-in: 147.03/.63 Wellesley repeater. Contact *Gerry Driscoll NV1T, (617) 444–2686.*

APR 25–28

DAYTON, OH The Dayton AR Assn., Inc. will sponsor the Annual Dayton HamVention at the Hara Arena Conference and Exhibition Center. Flea Market set-up will begin at 0800 Thurs., Apr. 25th. Flea Market operating times are: 0800–1800 Fri., Apr. 26th; 0600–1700 Sat., Apr. 27th; 0600–1600 Sun., Apr. 28th. Contact: *Flea Market Committee, (513) 767–1107.*

APR 26

DAYTON, OH The Dayton/Cincinnati Chapter of the Quarter Century Wireless Assn. will host the 1991 annual QCWA Banquet at Neil's Heritage. C.O.D. bar at 6:30 PM. Banquet starts at 7:30 PM EDT. Tickets $15 each, reservations required. QCWA membership not required. Contact *Bob Dingle KA4LAU, 657 Dell Ridge Dr., Dayton OH 45429. (513) 299–7114.*

SPECIAL EVENT STATIONS

VERMONT Throughout the coming year, Special Event Stations from Vermont will be on the air to help Vermont celebrate its 200th birthday. A special 200th Anniversary Certificate is available. SE Stations will be operating 25 kHz up from the bottom of the Novice and General bands. RTTY/AMTOR/etc. will be in the digital sub-bands. For certificate, send $1 and a SASE to *Amateur Radio Bicentennial Project, PO Box 200, Graniteville VT 05654.* Foreign stations, send only SAE and IRC's to cover postage.

APR 13

FORT PIERCE, FL The Fort Pierce ARC will operate KJ4YF from 1400Z–2100Z to commemorate the 4th Annual Trail Ride of the Florida Cracker Trail Assn. Operation will be on the 40, 20, 15, and 10 meter phone bands, and the Novice portion of 10 meters. For certificate, send QSL and large SASE to *FPARC, PO Box 0004, Fort Pierce FL 34954.*

APR 21

DELAWARE Never ones to learn from past mistakes, the members of the Warminster ARC will conduct their third annual DXPedition to the rare state of Delaware, operating WA3DFU/3. Frequencies: 7.275, 14.275, 21.375 and 28.375 MHz. CW contacts will be made on request. QSL with SASE to *Warminster A.R.C., Box 113, Warminster PA 18974.*

ST. LOUIS, MO The Suburban ARC will operate WØDCW, from 1800–2400 UTC, to celebrate the 44th Anniversary of the Club. Operation will be on the lower portion of the General Bands and 28.425 MHz (Novice 10 meter). Please send SASE for a QSL card to *Henry G. Schaper, Sr. KAØAWS, 241 Tapestry Dr., St. Louis MO 63129.*

APR 22–26

MADISON, WI The West High School ARC will operate Station KB9NG from 1300Z–2200Z, to commemorate West High School's Fine Arts Week. Frequencies: Lower 30 kHz of the General 20 meter and 15 meter phone bands and 10 meter Novice phone band. QSL, SASE to *WHARC, 30 Ash St., Madison WI 53705.*

APR 25–28

PADUCAH, KY The Paducah ARA will operate W4NJA to celebrate the annual American Quilters Society Convention. Frequencies—CW: 7.125, 14.050, and 21.150 MHz; phone: 3.875, 7.250, 14.250, 21.375, and 28.450 MHz; packet: 145.010. For QSL, send QSL and large SASE to *Paul Smith N4FFO, 229 Nickell Hts. Rd., Paducah KY 42003.*

APR 27

THOMASVILLE, GA The Thomasville, Georgia ARC will operate W4UCJ from 1830Z Apr. 26th until 0200Z Apr. 27th, and 1530Z–2300Z Apr. 27th, to celebrate the 70th annual Rose Festival. Frequencies: Lower CW portion of the General bands and Novice SSB portion of 10 meters. For a certificate, please send QSL and SASE to *Thomasville ARC, PO Box 251, Thomasville GA 31799–0251.*

POUGHKEEPSIE, NY The Poughkeepsie RAC will operate Station K2KN from the Young/Morse Nat'l Historic Landmark on the Hudson River from 1400 UTC–2000 UTC, to celebrate the 200th birthday of Samuel F.B. Morse. Frequencies—CB: 3.710, 7.110, 14.050, 21.110, 28.110 MHz ±10 kHz. SSB: 3.90, 7.235, 14.235, 21.335, 28.40 MHz ±10 kHz. DX QSL cards responded to via the ARRL DX Bureau. USA QSL cards answered when receiving SASE, and if a special certificate is desired, a 9"x12" SASE. Send to *Ted Zulkowski K2JMY, 4 Bishop Dr., Poughkeepsie NY 12603.*

INTERNATIONAL MARCONI DAY This year's event will be celebrated from 0000Z–2400Z. There will be about 15 stations representing Marconi communication sites around the world. North American sites are VE1IMD, VO1IMD and K1VV/IMD. Most site stations will use the suffix "IMD" or "/IMD." A certificate (modeled after an actual Marconi stock certificate) is offered to those who work the most Marconi sites (the number will be announced on the air). More award details will be given by site stations. All modes may be used this year; CW, RTTY, SSB and packet. The event is coordinated by the *Cornish RAC, PO Box 100, Truro TR1 1RX, Cornwall, England.*

APR 27–28

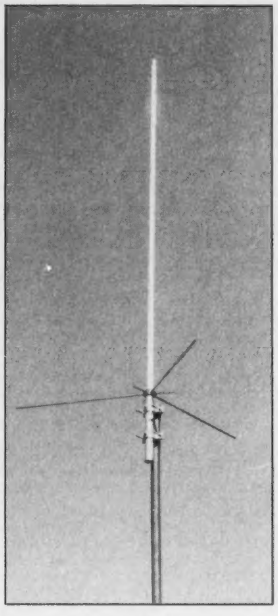
U.S.S. OLYMPIA The Olympia ARC will operate Station WA3BAT from aboard the U.S.S. Olympia, from 1300 UTC Apr. 27th–2000 UTC Apr. 28th, to commemorate the 92nd Anniversary of Admiral Dewey's triumph over the Spanish Fleet at the Battle of Manila Bay during the Spanish-American War. Frequencies—CW: 7.133 MHz; RTTY: 40, 20, 15 meter bands; 2 meter FM: 145.270; phone: 3.895, 7.245, 14.245, 21.365 and 28.365 MHz (±5 kHz QRM). For certificate, send QSL and 9" X 12" SASE with three units of postage/IRC's to *Olympia RAC WA3BAT, PO Box 928, Philadelphia PA 19105.*

Number 19 on your Feedback card

NEW PRODUCTS

Compiled by Hope Currier

PRODUCT OF THE MONTH

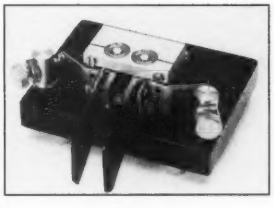


NCG Model CX-908

The Model CX-908 from NCG/COMET Antenna is the world's first triband base antenna for 144, 430 and 900 MHz. This one-piece, Fiberglas™ antenna will withstand wind velocities of 134 MPH, and is completely water/pollution-proof. It is extremely wideband, so it doesn't require frequency adjustment. Its lightning protection guards your transceivers. Using the CX-908 with a COMET triplexer (CFX-431, CFX-4310) will allow three-band TX/RX communications at the same time.

For prices and more information, contact *NCG Co., 1275 North Grove St., Anaheim CA 92806; (714) 630–4541; FAX (714) 630–7024.* Or Circle Reader Service No. 201.

Palomar Engineers



Many top CW operators consider the Kent key to be the world's best. The design and machining of the precision brass mechanism is by R. A. Kent Engineers in England; the key is assembled at Palomar Engineers in the United States. It features rotary ball bearings, fully-enclosed springs, and individual knurled thumbscrews to adjust dot and dash contact spacing and spring tension. The key has a smooth, effortless action because it has rounded paddles that are easy on the fingers. The small footprint (3" x 4") steel base weighs over two pounds.

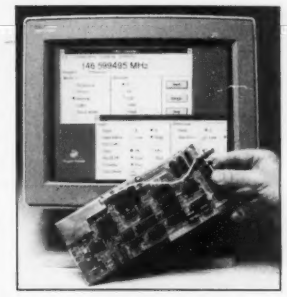
The price is $100, plus $4 shipping for the United States and Canada. Contact *Palomar Engineers, P.O. Box 455, Escondido CA 92033; (619) 747–3343, FAX (619) 747–3346.* Or circle Reader Service No. 203.

JDR Microdevices

JDR Microdevices has just released a new "Power Up" catalog, filled with products to help computer enthusiasts maximize the speed and efficiency of their equipment. The new products include JDR's own FrontPanel, a bus extender and instruction execution detector in one, perfect for hardware and software debugging; and JDR's Breadboard-on-a-Card Series, with decode, for faster, easier prototyping. Other new items include an accelerator card for A2000 with a high speed 28 MHz 68030 CPU, a modular circuit technology 486 motherboard, Amiga products, and an expanded software line with numerous software products for Windows.

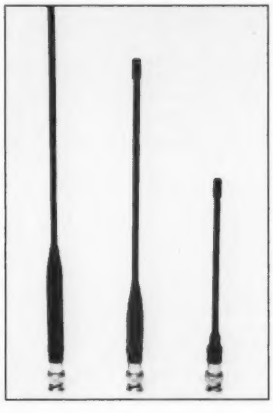
For a copy of the catalog, contact *JDR Microdevices, 2233 Branham Lane, San Jose CA 95124; (408) 559-1200, FAX (408) 559–0250.* Or circle Reader Service No. 204.

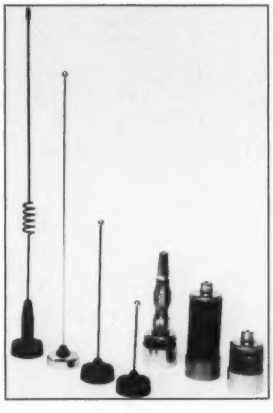
Optoelectronics



Optoelectronics has announced a radically new type of universal frequency counter-timer: a 9-inch drop-in card for personal and laptop computers. It uses Windows 3.0 as a control panel and display window, and it directly tunes radio receivers such as the ICOM R7000, resulting in a uniquely-configured self-tuning radio. The Model PC-10 is a 10 Hz–2.4 GHz radio instrument that competes with more expensive big name products. It measures, captures and analyzes discrete and average frequency readings, pulse width, time interval, period, and the ratio between two frequencies. It provides a useful "reciprocal counting" feature for 8-digit resolution of low frequency readings.

The Model PC-10 is priced at $335 in unit quantities. The Model AP10H option ($295) provides custom input amplifiers, signal conditioning and frequency prescalers. Contact *Optoelectronics Inc., 5821 NE 14th Avenue, Fort Lauderdale FL 33334; (800) 327–5912, (305) 771–2050, FAX (305) 771–2052.* Or circle Reader Service No. 205.





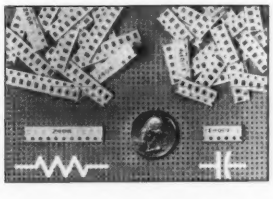
Valor Enterprises

Valor Enterprises has introduced a new line of rubber ducks (above left) available for 140, 220 and 440 MHz. These new portable antennas feature a BNC connector and a long-lasting vinyl dip coating for years of reliable service.

Valor, a longtime leader in the manufacturing of cellular and CB antennas, is also offering the new Omni-Gain line of land mobile antennas (above right) in all frequency ranges, including 900 MHz. A wide variety of mounting hardware is available.

For prices and more information, contact *Valor Enterprises, Inc., 185 West Hamilton Street, West Milton OH 45383; (513) 698–4194, (800) 543–2197, FAX (513) 698–7273.* Or circle Reader Service No. 202.

Communications Specialists



Communications Specialists, Inc. is now offering surface mount resistors and capacitors in small quantities and in individual values. The unit of sale is "per strip," and there is a $10 minimum requirement per order. Resistors come in strips of 10 for $2.50 per strip; capacitors come in strips of five for $1.25 per strip. Each strip is clearly marked with the value.

Contact *Communications Specialists, Inc., 426 West Taft Avenue, Orange CA 92665-4296; (800) 854–0547, (714) 998–3021, FAX (714) 974–3420.* Or circle Reader Service No. 206.

Number 20 on your Feedback card

BARTER 'N' BUY

Turn your old ham and computer gear into cash now. Sure, you can wait for a hamfest to try and dump it, but you know you'll get a far more realistic price if you have it out where 100,000 active ham potential buyers can see it than the few hundred local hams who come by a flea market table. Check your attic, garage, cellar and closet shelves and get cash for your ham and computer gear before it's too old to sell. You know you're not going to use it again, so why leave it for your widow to throw out? That stuff isn't getting any younger!

The *73 Flea Market*, Barter 'n' Buy, costs you peanuts (almost)—comes to 35¢ a word for individual (noncommercial) ads and $1.00 a word for commercial ads. Don't plan on telling a long story. Use abbreviations, cram it in. But be honest. There are plenty of hams who love to fix things, so if it doesn't work, say so.

Make your list, count the words, including your call, address and phone number. Include a check or your credit card number and expiration. If you're placing a commercial ad, include an additional phone number, separate from your ad.

This is a monthly magazine, not a daily newspaper, so figure a couple months before the action starts; then be prepared. If you get too many calls, you priced it low. If you don't get many calls, too high.

So get busy. Blow the dust off, check everything out, make sure it still works right and maybe you can help make a ham newcomer or retired old timer happy with that rig you're not using now. Or you might get busy on your computer and put together a list of small gear/parts to send to those interested?

Send your ads and payment to the *Barter 'n' Buy*, Donna DiRusso, Forest Road, Hancock NH 03449 *and get set for the phone calls.*

BATTERY PACK REBUILDING: SEND YOUR PACK / 48HR SERVICE. ICOM: BP2/BP3/BP22 $19.95, BP5/BP8/BP23 $25.95. BP24/BP70 $26.95, BP7 $32.95. KENWOOD PB21 $15.95, PB21H/PB6 $22.95, PB25/26 $24.95, PB2/PB8 $29.95; YAESU: FNB9 $19.95, FNB10/17 $23.95, FNB11 $29.95, FNB3/4/4A $36.95; STS: AV7600 $27.95, ZENITH/TANDY LT PACKS $54.95 "U-DO-IT INSERTS" ICOM: BP3/BP22 $16.95, BP5/8/24/70 $21.95. KENWD: PB21 $12.95, PB21H $18.95, PB24/25/26 $19.95; TEMPO/S $22.95. YAESU: FNB9 $16.95, FNB10/17 $18.95, FNB4/4A $32.95. AZDEN: $19.95. "NEW PACKS": ICOM BP8B (BS CHG) $34.95. SANTEC: 142/1200 $22.95. YAESU: FNB2/500 $19.95, FNB2/600 $23.95, FNB17 $34.95, FREE CATALOG. $3.00 Shipping/order, PA+6%, VISA-MC+$2.00, CUNARD, R.D.6 Box 104, Bedford PA 15522. (814) 623-7000. BNB258

CHASSIS, CABINET KITS SASE, K3IWIC, 5120 Harmony Grove Rd., Dover PA 17315. BNB259

DESK PAD DXCC country list and scratch pad all-in-one. Maximize contact time and desk space. 11" x 17". Hams in Seattle love it! Now available nationwide. 2 for $7.00 postage paid in USA. Free QSL note pad with order. Radio Stationery, 13212 E. 41st Terr., Independence MO 64055. BNB262

AMATEUR RADIO CLASSIFIED Quality equipment Buy/Sell/Trade publication. Published twice monthly. Samples free. Ads: 25 cents/word. Subscriptions: $12/yr. POB 245-S, Jonesboro GA 30237. BNB263

HAM RADIO KITS & ASSEMBLIES for various *QST* & *73* construction articles. We also offer books and electronic components. For catalog, send legal size SASE w/45¢ postage or $1.00 to A&A Engineering, 2521 W. La Palma #K, Anaheim CA 92801. BNB264

PERSONAL COMPUTER INTERFACING Practical instrument automation, networking and control techniques, including microcontrollers. A 3-day, hands-on workshop at the Virginia Tech campus, Washington, D.C., and Charlotte NC. $595, Blacksburg VA, March 21–22–23; Washington, D.C., June 6–7–8; Charlotte NC, July 18–19–20; and Blacksburg VA, August 22–23–24. Dr. Roy Jones (703) 231–5242/231–6478. BNB265

BLIND, BEDRIDDEN VETERAN would like friends to help by donating any shortwave or amateur radio receiver. Call Richard at 213–938–5347. Welcome letters. Write to: 5909 W. 6th St., Los Angeles CA 90036. BNB266

QSL CARDS- Look good with top quality printing. Choose standard designs or fully customized cards. Better cards mean more returns to you. Free brochure, samples. Stamps appreciated. Chester QSLs, Dept A, 310 Commercial, Emporia KS 66801, or FAX request to (316) 342–4705. BNB434

SUPERFAST MORSE CODE SUPEREASY. Subliminal cassette. $10. LEARN MORSE CODE IN 1 HOUR. Amazing new supereasy technique. $10. Both $17. Moneyback guarantee. Free catalog: SASE. Bahr, Dept 73-10, 7320 Normandy, Cedar Rapids IA 52402. BNB531

SB-220/221 OWNERS: 20 detailed mods which include 160–6 meter operation, QSK, +enhanced p.s. 50% rebate for new mods submitted! 9 pages of 3-500Z tech info. $11 postpaid.—Info. SASE, BOB KOZLAREK WA2SQQ, 69 Memorial Place, Elmwood Park NJ 07407. BNB581

ROSS' $$$$ USED April SPECIALS: KENWOOD TS-830S $789.90, TR-7800 $249.90, TS-930S/WAT $1199.90, BC-11 $69.90, BC-10 $35.90, TM-521A $429.90, TV-506 $209.90; ICOM IC-AH2A $349.90, AT-500 $249.90, R-71A+FLTERS $799.90, PS-15 $122.90; YAESU FC-757AT $259.90, FT-102 $569.90, DC-200 $59.90; KAYPRO 16 10 MEG HARD DISK $500.00, 2861 20 MEG HARD DISK $700.00, KAYPRO 10 10 MEG HARD DISK $400.00. LOOKING FOR SOMETHING NOT LISTED?? CALL OR SEND S.A.S.E., HAVE OVER 185 USED ITEMS in stock. MENTION AD. PRICES CASH, FOB PRESTON. HOURS TUESDAY–FRIDAY 9:00 TO 6:00, 9:00–2:00 P.M. MONDAYS. CLOSED SATURDAY & SUNDAY. ROSS DISTRIBUTING COMPANY, 78 SOUTH STATE, PRESTON ID 83263. (208) 852–0830. BNB654

WRITTEN EXAMS SUPEREASY. Memory aids from psychologist/engineer cut study-time 50%. Novice, Tech, Gen: $7 each. Advanced, Extra: $12 each. Moneyback guarantee. Bahr, Dept 73-10, 7320 Normandy, Cedar Rapids IA 52402. BNB691

ROSS' $$$$ NEW April (ONLY) SPECIALS: J.S.C. RG-213 500FT. $150.00; ELITE 33 FT.MOTOR HOME, LIST $100,000.00, NET $50,000.00 (DEMO); KENWOOD TH-26AT $259.90, R-5000 $849.00, TH-77A $500.00, TM-241A $324.90, TS-440SWAT $1209.90, TS-850SWAT $1609.90, TS-811A $1260.90; ICOM IC-735 $919.90, IC-761 $2200.00, IC-725 $765.90, IC-471A $709.90, IC-2SA $279.90, IC-24AT $459.90, IC-O3AT $385.00; AMERITRON AL-1200 $1699.90, AL-80A $979.90, AL-811 $534.90, AL-82 $1699.90; ASTRON RS-12A $68.95, RS-20A $87.90, RS-35A $139.90; ALINCO DJ-560T $379.90, DJ-160T $244.90, DR-570T $495.90, DR-110T $285.00, DR-590T $560.00; BUTTERNUT HF6V-X $144.90, STR-II $35.90. SEND S.A.S.E. FOR USED LIST. ALL L.T.O. (LIMITED TIME OFFER) LOOKING FOR SOMETHING NOT LISTED?? CALL OR WRITE. Over 9039 ham-related items in stock for immediate shipment. Mention ad. Prices cash, F.O.B. PRESTON. HOURS TUESDAY–FRIDAY 9:00 TO 6:00, 9:00–2:00 P.M. MONDAYS. CLOSED SATURDAY & SUNDAY. ROSS DISTRIBUTING COMPANY, 78 SOUTH STATE, PRESTON ID 83263. (208) 852–0830. BNB709

HAM RADIO REPAIR all makes, models. Experienced, reliable service. Robert Hall Electronics, Box 280363, San Francisco CA 94128-0363. (408) 729–8200. BNB751

WANTED: Ham equipment and other property. The Radio Club of Junior High School 22 NYC, Inc., is a nonprofit organization, granted 501(C)(3) status by the IRS, incorporated with the goal of using the theme of ham radio to further and enhance the education of young people nationwide. Your property donation or financial support would be greatly appreciated and acknowledged with a receipt for your tax deductible contribution. As 1991 begins, please look over whatever unwanted equipment you may have, and call us. We will pick up or arrange shipping. You will receive the tax deduction, but most important, the privilege of knowing that your gift really made a difference in the education and upbringing of a child. Meet us on the WB2JKJ CLASSROOM NET, 1200 UTC ON 7.238 MHz, and hope to see you at Dayton. Write us at: The RC of JHS 22 NYC, Inc., PO Box 1052, New York NY 10002. Round the clock HOTLINES: VOICE (516) 674–4072, FAX (516) 674–9600. BNB762

"HAMLOG" COMPUTER PROGRAM Full features. 18 modules. Auto-logs, 7-band WAS/DXCC. Apple, IBM, CP/M, KAYPRO, TANDY, CR8 $24.95. 73-KA1AWH, PB 2015, Peabody MA 01960. BNB775

LAMBDA AMATEUR RADIO CLUB International amateur radio club for gay and lesbian hams. On-air skeds, monthly newsletter, and annual gathering at Dayton. (215) 978–LARC. PO Box 24810, Philadelphia PA 19130. BNB812

INEXPENSIVE HAM RADIO EQUIPMENT. Send postage stamp for list. Jim Brady—WA4DSO, 3037 Audrey Dr., Gastonia NC 28054. BNB890

WANTED: BUY & SELL All types of Electron Tubes. Call toll free 1 (800) 421–9397 or 1 (612) 429–9397. C & N Electronics, Harold Bramstedt, 6104 Egg Lake Road, Hugo MN 55038. BNB900

ELECTRON TUBES: All types & sizes. Transmitting, receiving, microwave . . . Large inventory = same day shipping. Ask about our 3-500Z special. Daily Electronics, PO Box 5029, Compton CA 90224. (800) 346–6667. BNB913

COMMODORE 64 HAM PROGRAMS—8 disk sides over 200 Ham programs $16.95. 25¢ stamp gets unusual software catalog of Utilities, Games, Adult and British Disks. Home-Spun Software, Box 1064-BB, Estero FL 33928. BNB917

CODE RTTY Send-Receive Disk VIC-20, C-64, send $5. Tape $6. Codeware, Box 3091, Nashua NH 03061. BNB940

WANTED: For museum and author—pre-1980 microcomputers and publications—also need CPM computers, Osborne, Kaypro, etc. Need author to write detailed book on how to use the PACKRATT software. Dave Larsen KK4WW, Blacksburg Group, PO Box 1, Blacksburg VA 24063-0001. (703) 763–3311/231–6478. BNB945

JUST IMAGINE your own beautiful Blue Ridge mountain top QTH—selling my 323-acre Christmas tree farm—all or part—trees optional. KK4WW, Floyd VA. (703) 763–3311. BNB956

CUSHCRAFT, Barker & Williamson, power supplies, rotors, baluns, center insulators, ladder line, coax, connectors, surplus tubes. ATKINSON & SMITH, 17 Lewis St., Eatontown NJ 07724. 1 (800) 542–2447. BNB957

2600/2510 OWNERS Enjoy both 10 meters *and* 12! Easy conversion, all parts and instructions, $49.95. Edward Oros, 2629 Sapling Drive, Allison Park PA 15101. BNB958

FREE Ham Gospel Tracts, SASE, N3FTT, 5133 Gramercy, Clifton Hts. PA 19018. BNB960

FIVE WATTS! QRP "E-Z-KITS!" With complete instructions! Specify 30 or 40 meter model. Only $15 plus $2.50 First Class shipping! Bill Lauterbach, 1709 N. West, #103, Jackson MI 49202. BNB962

PRINTED CIRCUIT BOARDS for projects in *73, Ham Radio, QST, ARRL Handbook.* List SASE. FAR Circuits, 18N640 Field Ct., Dundee IL 60118. BNB966

SATELLITE MONTHLY AUDIO CODES 1 (900) HOT-SHOT. Intended for testing only. $3.50 per call. BNB976

AMIGA, MACINTOSH, ATARI XL/XE/ST Amateur radio and electronics PD software, $4.00/disk. Send 2 stamps SASE for catalog. Specify which computer! WA4EFH, Box 1646, Orange Park FL 32067-1646. BNB978

AZDEN SERVICE by former factory technician. NiCads $36.95 plus shipping. Southern Technologies Amateur Radio, Inc., 10715 SW 190 St. #9, Miami FL 33157. (305) 238–3327. BNB979

DIGITAL AUTOMATIC DISPLAYS Kenwood, Yaesu, Collins, Drake, Atlas, etc. No bandswitching required. Business 45¢ S.A.S.E. Be specific. GRAND SYSTEMS, Dept. A, PO Box 3377, Blaine WA 98230. BNB981

NOW YOU CAN OWN THE ULTIMATE JRC-JST 135 or JST 135 HP HF transceiver. Also the general coverage HF receiver JRC-NRD 525 or NRD 535. Our special prices: JST-135, $1749.00; JST-135 HP $2949.00; NRD-525 $1049; and NRD-535 TBA. Call Henry, N4EDQ, AMATEUR RADIO SALES, 1 (800) 828–6433. Also let us be your accessories and complete radio store. BNB982

TRAVEL! HIGH INCOME! Radio officers needed for shipboard employment. Must have FCC Second Class Radiotelegraph license and background in electronics. Salary approximately $4,000 monthly to start, including vacation plus full benefits. Rae Echols, W7FFF, American Radio Association, 5700 Hammonds Ferry Road, Linthicum Heights MD 21090. BNB983

HW-8 HANDBOOK. It's back and bigger than ever. Modifications for the Heath HW series of QRP radios, including the new HW-9. $7.95 for US and VE, including first class postage. $12.95 for DX. Send to Michael Bryce, WB8VGE, 2225 Mayflower NW, Massillon OH 44647. BNB984

REPOSSESSED VA & HUD HOMES available from government from $1 without credit check. You repair. Also S&L bailout properties. Call 1–805–682–7555 ext. H-4470 for repo list your area. BNB985

SEIZED CARS, trucks, boats, 4wheelers, motorhomes, by FBI, IRS, DEA. Available your area now. Call 1–805–682–7555 ext. C-3968. BNB986

TEST EQUIPMENT WINTER CLEANOUT SALE. Many good, lab grade items at lowest prices, must be sold. HP-140T spectrum analyzer, Tektronix portable scopes 453, 475, HP-606A Sig/gen, 5245L counters, 500 MHz, 3-GHz, GR, Boonton bridges, DVMs, much more. Can't list all here—please SASE for huge list. Joseph Cohen, 200 Woodside, Winthrop MA 02152. (617) 846–6312. BNB987

XEROX DESKTOP COMPUTER. CPM. WP/SS/BASIC software, manuals. Transcriber, Heath HW-7, SB101. Other computer, photographic, ham stuff. TRADE for 2 meter rig, frequency counter, etc. Dean, POB 10362, Eugene OR 97440. (503) 683–2985. BNB988

BACK BY POPULAR DEMAND: W1FC Collins design vertical phase switching. REVOLUTIONARY HYBRID AERIAL PRODUCT: 168 strand copper "FLEX-WEAVE" Tm, #14, strong, ultra flexible, nonstretch, won't rust/kink like copper weld, $34 first 275' (minimum), $.12/ft thereafter, includes shipping! *Updated* **ANTENNA PARTS CATALOG, LOWEST PRICES:** Dipole/quad/GROUND RADIAL WIRE, insulators, baluns, center feeds, OPEN WIRE FEED LINE, premium coaxes, lowest cost RG-213 mil spec $.39/ft. RG-8X $.20; HV & specialty wire. Catalog: $1.00, DAVIS RF, PO BOX 230-S, Carlisle MA 01741. (508) 369–1738. BNB989

GROUND RADIAL WIRE FOR VERTICALS OR SLOPERS: Improves performance, new #16 bare solid copper. LOWEST COST: $38 1000 feet, includes shipping! STATION GROUNDING SYSTEMS, a must for family/equipment safety. *Updated* Catalog of specialty wire, coax, VERTICAL PHASE SWITCHES (W1FC), antenna parts, lowest costs: $1.00 DAVIS RF, PO BOX 230-S, Carlisle MA 01741. (508) 369–1738. BNB990

NOW IT'S A TAD SMALLER!
(MUCH SMALLER IN FACT)
THE BABY M-8 AT A DIMUNITIVE PRICE
INTRODUCTORY PRICE
W/FREE CTCSS MODULE
$489.95 CAD/USD

- Sized for smaller cars & smaller budgets
- Use for police, fire, MARS, CAP, EMT, etc.
- 40 channels—25 watts
- Fully field programmable
- Rugged as the renowned M-8
- Priority Channel w/scan
- Wideband 24 MHz TX 38 MHz RX
- FCC type accepted for commercial service
- Shipped with UP/DOWN mike, mobile mount and power cable.
- DTMF mike available
- Wideband antennas, power supplies and other accessories available at reasonable prices. Dealer Inquiries Encouraged.

AXM INCORPORATED
11791 Loara St., Suite B
Garden Grove, CA 92640-2321
CALL 714-638-8807 or
FAX 714-638-9556 for immediate attention

CIRCLE 243 ON READER SERVICE CARD

TWO METER SPECIAL

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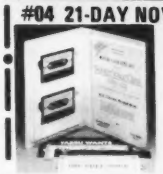

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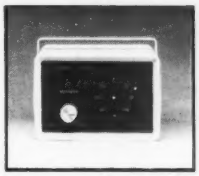

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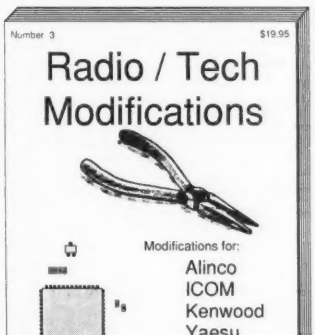

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User Rights, Revisited

Since I began writing this column back in 1972, the single question that I have been most often asked to address is that of the rights of repeater users in determining the overall operating standards of a given system. I'm not just referring to the technical aspects of system operation, I'm thinking in terms of every aspect: technical, social and legal.

Where I live, repeaters come in three categories: open machines, closed machines and private machines. Actually, if you add the so-called "super private" and the "pirate/uncoordinated" systems, there are really five very different operational categories. Thankfully, the rest of the nation is not as title-conscious as Southern California. Almost everywhere else, all you find are open and closed coordinated boxes and a smattering of the "uncoordinated" pirates.

In my travels nationwide, I have noticed one amazing thing: Whether a repeater is open or closed, it usually falls under one distinct form of internal operation. Either it is a club repeater whose operation is governed by a repeater trustee elected by the membership, or it is an individually owned and operated system, run by what has become known as a "benevolent dictator." In either case, the outcome is the same. An individual or a small group determines what all others who pass their audio through a repeater can or cannot say. There is a monarchy, so to speak, where there are essentially "gods" in the form of repeater owners, and "peasants" in the guise of a repeater's usership. This is the basic and tenuous relationship that really has been around since the days of the old AM repeaters in the late '40s, and out of it has grown the vast repeater network that spans the length and breadth of the United States, as well as its neighbors to the north and south.

At this point, it is probably fair to say that if the system works, why change it? I think you can answer this question by asking, "Why change apartheid?" If you think about it, what is going on in South Africa and on the VHF/UHF repeater subbands is really the same in essence—a small minority lording over a vast majority. Be it for racial reasons or ego fulfillment, playing God over others is just not tolerated in this society or age.

The truth is that the system has not really worked. Oh, I'll admit that it is staggering to have almost 10,000 repeaters on 2 meters in the United States. According to listings in the *ARRL Repeater Directory*, that is. The number approaches 15,000 when you take all other bands into account. And that is not even considering the thousands of remote bases that sit atop mountains and tall buildings, giving a single individual with a handheld total access to all modes on all bands. So, on the surface, there is a look of success.

But when you listen closely, you find that there are a lot of very unhappy people out there. These are people who, by virtue of the fact that they have invested money in a handheld, a mobile, and a base radio installation, feel that it is their God-given right to also demand a say in the way every aspect of every repeater they use is to be run. In the '70s, these people were openly called "fanatics" by their peers. In the '80s, their call began to get some valid attention as their numbers began to grow. Now, with the end of the first year of the 1990s, the concept of user rights has surfaced again, and this time it has the backing and support of a wide segment of the population of Southern California.

In fact, like it or not—and that depends on whether you are a repeater owner or a repeater user—the demand for so-called "user rights" is now the hottest topic in this part of the country, and as word of the coordination board action of October 6, 1990, begins to reverberate across the nation, it is sealing the fate of repeater "gods" everywhere. It is saying to repeater owners—be they clubs or individuals—that the day of total owner control is at an end. It has now ended in my part of the world, and you can be pretty certain that it will eventually end in yours. It ended because a repeater coordination council has said to the world that the wants, wishes and desires of repeater users take precedence over anything that a system owner may want or demand. TASMA has said that users do have rights!

The TASMA Meeting

TASMA, Southern California's Two Meter Area Spectrum Management Association, is the 2 meter by-band coordinator for all activity across the state, and south from the Tehachapi mountain range down to the Mexican border. The other two are SCRRBA, the Southern California Repeater Remote Base Association, taking care of 6 meters and all UHF/Microwave coordination; and the 220-SMA which, as its name implies, coordinates 220 MHz. But, unlike repeater councils, both TASMA and 220-SMA are chartered as overall spectrum management groups. In other words, repeater coordination is only supposed to be a tiny part of all-around band management. All three groups can trace their lineage to the original California Amateur Relay Council, the nation's first coordination body in the late '50s.

As such, TASMA is hardly a Johnny-come-lately to the arena of settling disputes between repeaters, but until now, even it has shied away from tackling a repeater-user versus repeater-owner fray. But when it broke away from the now-defunct Southern California Repeater Association in 1979, it also widened its sphere of influence to include every signal that would ever be put onto 2 meters in the region, and its bylaws gave the promise of equal representation before the membership to any individual or group that requested it. So, TASMA agreed to listen to the complaints of a group of users who claimed that the owner of the repeater they used was literally pulling the rug out from under them. They claimed that the owner, Dave Witt KE6HN, was using the repeater to punish them because he did not like the way that they operated. He did this by locking out the repeat function and playing Gordon West Radio School CW training tapes—music and all—whenever he or his control operators did not like what was being said.

The user group bringing the matter to TASMA was from the 147.435 machine, a high-tempered system that has gone through more than a half-dozen owners since its inception over two decades ago, starting out as WA6TDD in the late 1960s. The .435 system, whose callsign when this story began was KE6HN/R, sees and talks to much of the southern portion of the state, with coverage into northern Baja California, Mexico. Even on its odd-split frequency pair of 147.435 in/146.40 MHz out, it was one of the nation's most populous repeaters, with a user base in the late '70s nearing 700. But numbers brought problems. Unlicensed operators, jammers, and a smattering of foulmouths worked their way into the daily regimen of .435 operation. The situation kept getting worse and worse, and the system owner wanted to clean it up, but the users of .435 wanted a free and open forum for discussion of any and all subject matter. They wanted no prohibitions on language, and said that each would take legal responsibility for what he or she said on the air. This conflicted with recent interpretations of the Part 97 rules which place shared responsibility for content of repeated communications on the originating station and the licensee of the relay operation. This notwithstanding, the usership demand was for minimal control by the system owner, Dave Witt KE6HN.

The Winds of Change

In mid-1990, KE6HN petitioned TASMA to permit him to close and make private the long-established open .435 machine. Reportedly, this was to be a part of the way in which he would change the atmosphere on .435 and clean out the "rat's nest." TASMA told Witt that the frequency pair was reserved for an open operation system, and that he must continue operation in that category. (In Southern California, once a system's operational format has been established, no changes can be made without the approval of the coordination council.)

Witt was also told by TASMA that the code practice tapes that he was running to censor user comments and counter what he felt to be abusive user behavior must be stopped. While the precedent of using code practice tapes to control user abuse was established in the 1970s on the old K6MYK repeater, not until now has this system owner practice been challenged by users before a coordination body.

TASMA Acts

Based on audiotapes provided, and a petition from the users written by Professor Roy Tucker N6TK and circulated by Jensen Woods WB6ZFU, TASMA's membership voted to issue a "Show Cause" order to KE6HN, giving him until the next TASMA meeting (approximately 30 days) to show the coordination organization why he should not lose his right to operate the repeater bearing his callsign. He was also admonished in absentia for changing the repeater callsign to one of another ham, and TASMA has indicated that it will not recognize such a change because its coordination guidelines call for pre-approval of any such operational modification.

In issuing its decision against Witt, the TASMA Board of Directors made it clear that the repeater's user base, and the system owner adhering to the long established use of the channel for open operation, were their prime interests. They also indicated that repeater users have a right to expect that repeaters will always be run as the channel pair sanction stipulates—a stand that many coordinators have held privately, but never before shown so forcefully in public.

TASMA then stripped Witt of his sanction to operate the .435 repeater and recoordinated the frequency pair to Jensen Woods WB6ZFU. Witt was given a chance to file an appeal, which he did. But before the appeal could be heard, Witt surprised everyone by selling off the repeater hardware to Roy Tucker N6TK and Woods, thus codifying the TASMA decision as a "de facto" coordination regulation for the region. As we go to press, Woods is doing everything humanly possible to rid .435 of its jammers, foulmouths, carrier-throwers, unlicensed operators—and its bad reputation in the area. At this writing, what he has undertaken seems to be an almost superhuman task, and we wish him well. Will WB6ZFU succeed where many others have failed? Only time will tell.

A Public Utility?

There is a caveat to this change. In effect, TASMA has unintentionally codified what many hams have felt for the better part of two decades. That is, repeaters are now not as much ham radio stations as "amateur radio public utilities." They, along with the newer packet digipeaters, are the de facto "telephone and telegraph relay stations" of the world of amateur radio. Hams expect repeaters to be there, 24 hours a

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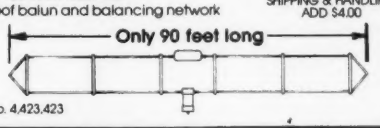

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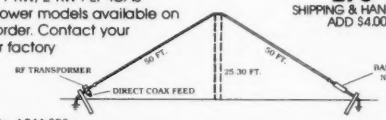

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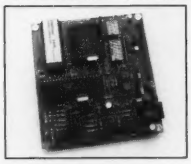

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day, seven days a week, 52 weeks a year, at the beck and call of anyone with a ham ticket and the money to purchase a transceiver of his own. Therefore, the TASMA decision regarding .435 in Los Angeles will impact on all of the nation's repeaters and repeater owners in ways never dreamed of before.

Like it or not, TASMA's decision concerning .435 means that organized user groups can now place demands on repeater operators, and those owners will be forced to comply with their whims or be run off the air by someone who will comply. On the negative side, it could mean that a budding system owner who can't find a spot for his new machine might "raid" another repeater's user base for support. On a more positive note, since the user group's voice will be heard as well as the repeater owner's voice, the owner will be able to more actively challenge co-channel and adjacent channel systems to abate any interference. The greatest impact of all may be that of making "closed" and "private" repeaters vulnerable to decoordination in favor of high volume user-load open systems.

If you think that none of this will ever take place, you know little about human nature, and even less about the crowded repeater subbands. I'll bet that it actually begins to happen long before this reaches print. In our litigatory society, it will also only be a matter of time before TASMA's decision to favor user groups over repeater owners leads to court challenges to other repeater coordinators who fail to consider user complaints. It will also most assuredly lead to litigation between user groups and system owners, and vice versa. Then again, no decision made by man is perfect, and TASMA, like all other repeater coordination groups, is made up of human beings.

Hindsight is Wonderful

Ten years ago, in this same column, I predicted that it wouldn't be long before user rights became the most important issue to surface in the world of VHF/UHF relay communications. I was off by about half a decade, but not wrong on seeing the problem. Now it is here, and with it the distinct possibility that tens of thousands of potential repeater owners and users will come to the hobby with no-code Technician class tickets, and the right to put up repeaters of their own.

How do the repeater coordinators and repeater owners of today see themselves? The users—hams like you—are demanding a full measure in determining the way a repeater—all repeaters—will be run. The owners and coordinators may have no alternative but to listen and act on your desires, or take their repeaters off the air forever. As Bob Dylan sings, "...the times they are a changin.'"

Special thanks to Rich Yarigian N6PVP for attending the TASMA meetings and researching much of this story. 73

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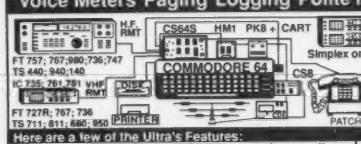

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No Fooling

I hate April Fool's Day. I really do! Somehow, there is nothing so low as tricking someone into believing some untruth or fantasy. Unfortunately, so many hams become such fools when they purchase this or that RTTY communications program. This month, I'd like to tell you about a program that won't "fool" you or take you to the poorhouse with cost.

After several editions, Skyline Associates' TRTY.EXE program has matured into one that rivals commercial offerings. Originating in the Heath Computer Radio Net, this program, authored by T.L. Vinson and coauthored by all the participants of the net, features a dual port and split screen radioteletype interface that allows full computer control of a RTTY station.

The TRTY.EXE Program

Highlighted features of TRTY.EXE version 3001.00 include:

- Support for two serial ports simultaneously, in half or full duplex.
- Ability to run AMTOR, packet, or RTTY communication, in any combination of two modes.
- Support for Baudot and 7 or 8 bit ASCII, with baud rates of 45 to 9600.
- Software and hardware handshaking.
- User-selectable screen colors, text, background, window edges and borders.
- Configuration of files, recalled by name.
- Ability to assign different callsigns to each port.
- Option to set the program to BEEP when it recognizes your callsign.
- Full-screen editing.
- Scrolling option, through previously shown text.
- Ability to edit text in one window, while monitoring one or both ports in other windows.
- Compatibility with IBM PCs, clones, and the Zenith Z-100, with 300K RAM, and MS DOS or PC DOS versions 2.0 or higher.

When the program is booted, the logo screen, shown in the figure, is displayed. If this bothers you, it can be switched off. The split screen display is where the bulk of communicating is performed. Hitting the F1 key brings up the HELP menu. This menu leads to a variety of submenus for both help and editing program features.

A look at some of the specifics of this program makes you realize what a finely honed tool it is. For example, TRTY supports 3rd and 4th level Baudot. This is a programming technique in which the full ASCII character set is represented in 5-bit Baudot, by using Blank-FIGS or Blank-LTRS combinations to indicate a shifted set. Received on a conventional teleprinter, normal Baudot is printed; received on another TRTY station, upper and lower case data can be exchanged.

There is also a RELAY mode, which allows remote stations access to relay messages through your station, without operator intervention. In this mode, a timer prevents messages from staying too long in the program's buffer, and ensures practical use of the feature.

Full keyboard remapping is also supported. This means, on one level, that any command normally assigned to a control key combination may be shifted as desired. Such a facility allows you to customize the command structure and syntax to suit both what you are used to (with other programs, for example) and what you find easy to remember. Hams speaking languages other than English may benefit from this by translating commands into their native language, which often changes the initial letter.

Remapping may go so far as to change any letter key, number key, or control combination on the keyboard. Thus, if an alternate key arrangement, whether it be alphabetic or Dvorak, is appealing to you, TRTY can accommodate your needs.

There are 26 callable strings per session, or 52 in all, which can be called individually or in tandem through the use of control sequences placed within the strings. Written in plain ASCII, these strings are limited to 80 characters each. But they may contain short, usually two-character, control sequences to insert a callsign, carriage return, a fancy margin, another string, a transmitter turn-on signal, or some other function.

Remote control of another station, through a relay, is even possible, through the use of a WRU (Who Are You) function, as long as all stations involved are using TRTY or one of its variants.

Tested with many packet TNCs and AMTOR setups, this appears to be quite a powerful package. A listen across 80 and 20 meter RTTY the other night turned up several stations using TRTY, and several more discussing it. My kudos to T.L. Vinson and the members of the Heathkit Amateur Radio Net for making this program available.

You can get your very own copy of TRTY from several sources. Certainly, the easiest way would be from another ham, or a ham club. Lacking that, the program is available both on CompuServe HamNet, and also on Delphi, where it may be found in the PC Forum, telecommunications library; and the Hobby Forum, Ham library. If all else fails, I will provide a copy to readers of this column who send me a disk, either 5¼" or 3½", a stamped, self-addressed disk mailer, and two dollars, to the above address. This will be for a limited time only, and as my schedule permits.

We've got a lot in the hopper over here. A few more pieces of software, and a few more updates from things gone by. But I can always use more. Keep those comments and suggestions coming, by mail, to the above address, or via CompuServe (ppn 75036,2501) or Delphi (username MARCWA3AJR). 73

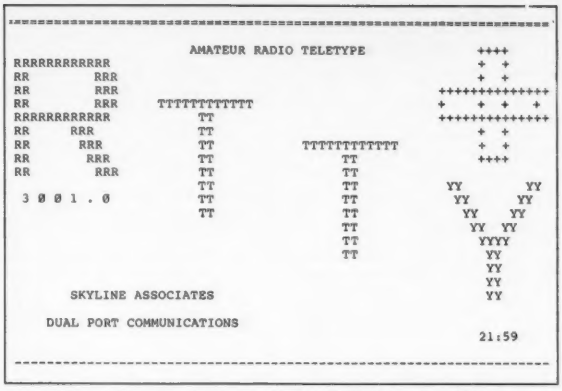

Figure. The opening logo screen of TRTY, version 3001.0.

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Mir on Packet

Since late January, the callsigns U2MIR and U2MIR-1 have been covering the Earth with FM packet signals from the Soviet Mir Space Station. This activity was not expected until March, but there have been no complaints. Signals have been very strong, although Musa Manarov (U2MIR) turns the power down to 2 watts when the system is running unattended.

How to Hear and Copy U2MIR

Any station that is packet-ready, with a synthesized 2 meter transceiver, can hear Mir and display packet activity from the space station. HTs with rubber ducky antennas are usually insufficient for two-way contacts, but with a slightly better antenna they can at least provide good copy. Several hams have established "connects" with the onboard BBS (U2MIR-1) using mobile packet stations with at least 10 watts to whip antennas.

Mir operates on 145.55 MHz over the United States. Simultaneous activity can occur with the onboard BBS via U2MIR-1. Figure 1 shows an early example of BBS activity. (The system date and time had not been initialized, yielding "0's" for those parameters.)

Doppler shift causes signals to appear off-frequency for fast-moving objects like the space station. When Mir is approaching, the apparent frequency will be high by as much as 3.5 kHz. To counter this effect and get good copy of the incoming packets, your ground-based 2 meter rig should be set to 145.555 MHz for the beginning of any pass exceeding 20 degrees elevation. When Mir is at its closest approach, the frequency should be set to 145.55 MHz. As it heads for the opposite horizon, best copy will occur around 145.545 MHz. An FM rig with tuning increments less than 5 kHz, and a discriminator, can be continuously adjusted to give true centering on the signal from above.

Doppler shift also affects the uplink from a ground-based station. Unlike the U.S. space shuttle activity, there is no frequency offset for signals to space, but the Doppler effect will make uplink signals appear high in Musa's radio during approach, and low during departure. The easiest way to counter the effect is to transmit on 145.55 MHz, with deviation set no greater than 3 kHz. For those with frequency-agile radios, the transmitter can be set a few kHz low during approach, and a few kHz high as Mir leaves.

If the signal from aloft is heard 2 kHz above 145.55 MHz, then the transmitted signal should be 2 kHz below 145.55 MHz. For most passes, a setting of 145.55 MHz for both uplink and downlink will suffice, with minimal loss of packets. The example in Figure 1 was obtained with a simple mobile rig with 5 kHz tuning increments and a typical crossed yagi used for amateur satellite activity.

Tracking Mir is not as easy as tracking other hamsats. The space station is in a very low orbit with passes lasting no more than 12 minutes. For those with satellite tracking programs, the element sets defining the station's orbit must be updated on a weekly basis for high accuracy. Month-old data sets can give errors as much as 20 minutes off if the station has been reoriented. (The cosmonauts on Mir reposition the craft for docking with resupply ships, and to counter the effects of atmospheric drag.)

If you do not have a satellite tracking program, there have been several free offerings on various computer bulletin board systems. AMSAT, the Radio Amateur Satellite Corporation, sells many extremely good programs for several types of computers. Complexity ranges from InstantTrack for PC machines with at least EGA graphics, to simple HP-41 calculator-style programs, and everything in between. For information on the many offerings, call AMSAT's office at (301) 589–6062, or write to: AMSAT, P.O. Box 27, Washington DC 20044. Discounts are available for AMSAT members.

Getting current element sets for Mir used to be very difficult. Although NASA prediction bulletins are available for the asking, they are usually too outdated by the time they show up in the mail. The best source is AMSAT bulletins via packet radio. Every week, N3FKV puts together the latest element sets for the amateur satellites and sends them out through the packet network.

Most packet BBS's carry AMSAT News Service items, and the latest element sets. Two formats are supported: the standard "AMSAT" format, which lists each orbital parameter with the appropriate description, and the "two-line" format, which appears as a cryptic list of numbers. While the AMSAT format is accepted by most computer programs, it is most useful for those programs that do not allow automatic updating. Programs for older computers and calculators cannot support automatic updates. The two-line format is most appropriate for advanced software packages that recognize the location of the numbers in the listing and know where to place them in the element-set data strings. Either way, the end result is the same: Current orbital data is available and can be loaded and put to use within a day or two of its uploading into the packet BBS network.

In Figure 1, there is a line stating, "No third party mail allowed." This may mean that only messages for U2MIR or other cosmonauts are allowed on the system. Many times the BBS is off the air. Musa may have turned the ham equipment off for sleep periods or other reasons. He might even be available for voice contacts.

This new BBS in the sky is easy to hear and very popular. Don't be surprised when "connect" requests are met by "busy" signals, with the associated "disconnect" message. A lot of hams are monitoring 145.55 MHz and waiting for an opportunity to connect and try out their systems. QSLs for current Mir contacts should be sent to: UA6HZ, Valery Agabekov, Box 1, 375600 Yessentuki, USSR.

```
U2MIR-1>CQ UI R>:
U2MIR-1>CQ UI R>:CMD(B/H/J/K/KM/L/M/R/S/SR/V/?)>
U2MIR-1>CQ UI R>:No third party mail allowed
U2MIR-1>CQ UI R>:
cmd:c u2mir-1
*** CONNECTED to U2MIR-1
Logged on to U2MIR's Personal Message System
CMD(B/H/J/K/KM/L/M/R/S/SR/V/?)>
L
Msg # Stat  Date      Time To      From     @ BBS Subject
77 P        00/00/00  00:00 U2MIR  WB6LLO    VOICE
76 PR       00/00/00  00:00 U2MIR  ZL1AFC    v
75 PR       00/00/00  00:00 ZL2AVK ZL2TT     greetings
74 PR       00/00/00  00:00 VK4AGL VK4ZF     greetings
72 P        00/00/00  00:00 U2MIR  K1HTV     Hello again Musa
71 P        00/00/00  00:00 U2MIR  WD4AHZ    Hello
70 P        00/00/00  00:00 U2MIR  ZL1TRE    Hello again
69 PR       00/00/00  00:00 U9MIR  VK3CFI    eva
68 PR       00/00/00  00:00 U2MIR  VK3CFI    more list
67 PR       00/00/00  00:00 U2MIR  VK3CFI    list commands
2436 Bytes free
Next message Number 78
CMD(B/H/J/K/KM/L/M/R/S/SR/V/?)>
?
B(ye)     B [CR] disconnects you from PMS.
H(elp)    H [CR] or ? [CR] displays this help file.
J(log)    J [CR] displays a list of callsigns heard (optional date/time)
K(ill)    K n [CR] deletes message number n (only to/from your callsign).
KM(ine)   KM[CR] deletes all READ messages addressed to your call sign.
L(ist)    L [CR] lists the 10 latest messages.
M(ine)    M [CR] lists the 10 latest messages to/from your callsign.
R(ead)    R n [CR] reads message number n.
S(end)    S (callsign) [CR] begins a message addressed to (callsign).
          Subject: max 28 characters ending with [CR].
          Text: End each line with [CR]. End message by typing /ex [CR] or
          CTRL-Z [CR] at the beginning of a new line.
          SR(eply) SR n[CR] Sends a reply to message n prompting only for
          text.
          V(ersion) V [CR] displays the software version of the PMS system.
          CMD(B/H/J/K/KM/L/M/R/S/SR/V/?)>
B
 - Logged off
```

Figure 1. Example of Soviet space station Mir BBS activity.

STS-37

The latest U.S. ham-in-space activity is about to take off with a full crew of ham astronauts. The most recent launch date information targets early April. Packet, voice, slow-scan TV and fast-scan TV experiments have been planned. A space-mobile to space-mobile voice or packet QSO from Mir to STS-37 is also a goal. For information on the system configuration and mission goals, see "SAREX-90, Ham-in-Space Shuttle Missions" by Tom Clark W3IWI, Ron Parise WA4SIR and Bill Tynan W3XO, *73*, May 1990. p. 9. Unlike Mir packet activity, the U.S. equipment typically uses a 600 kHz offset for uplink signals. For a downlink of 145.55 MHz, the uplink is 144.95 MHz. DO NOT call the shuttle on 145.55 MHz. 73

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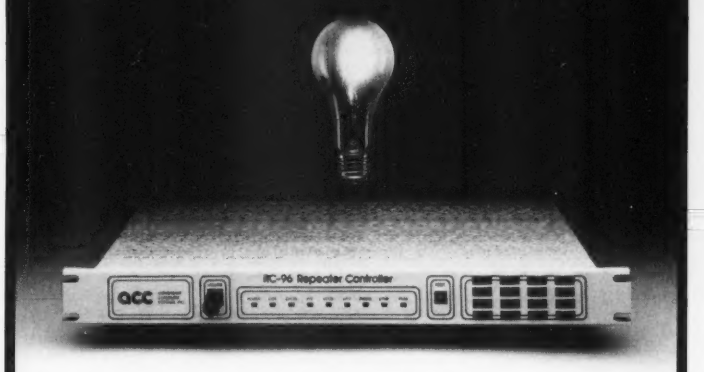

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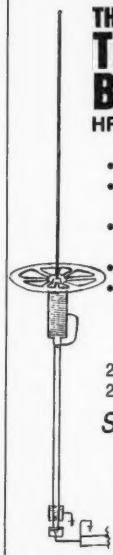

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Microwave Devices

I'd been planning to construct an RF sweeper for portable operation, mainly for use in a spectrum analyzer, but I didn't have the circuits for driving the wide-frequency YIG (Yttrium Iron Garnet) oscillator.

When the schematic was presented to me, and I'd picked up a surplus log amplifier (from a military radar test set) for the IF system, this project was off and running. The log IF amplifier, a key item in the spectrum analyzer, works at 160 MHz and gives the system 90 dB of dynamic range. The unit has 12 transistorized IF stages which feed a logarithmic diode summing network that feeds a video output amplifier. This output is the vertical input to the oscilloscope.

I bought my scope, a cardiac oscilloscope, at a local flea market for $5. It is battery-operated (12 volts) and has a very slow (long-persistence) trace, but a regular o-scope will work just fine.

YIG Description

YIG oscillators are, I feel, the "dilithium" crystals used in warp-drive oscillators from the future. The YIG crystal forms a highly polished, spherical microwave resonator less than 1/100" in diameter. It behaves like a resonant circuit coupled to an oscillator transistor, usually of common base configuration. The YIG sphere generates a very strong magnetic field about the main coil. By varying the strength of the magnetic field, you change the sphere's resonance and the oscillator's frequency.

The main coil consists of two large electromagnet coils on each side of the crystal chamber in series with the DC supply. This coil is polarized, with one DC positive lead for current drive input.

DC current from the main coil is applied at right angles to the sphere's microwave coupling loop. The YIG is fussy. If the current through the main coil is too high or too low, the circuit will not oscillate at all.

I do NOT suggest that you take a YIG apart to see what is going on inside. Although you can separate the magnetic poles in the main coil to look at the construction, to go any further requires extreme diligence.

Now there is both good news and bad news. The bad news is that these devices cost big bucks new, and you can't home-brew them. The good news is that you can get them from surplus in a frequency range from 1500 MHz to over 12 GHz. Low frequency YIGs cover just over 1 GHz, and high frequency YIGs can cover greater frequency ranges. They differ in the amount of current, from 150 mA to over 800 mA, they require to drive the magnets.

This main coil current is critical. My oscillator requires about 425 mA to begin oscillating (low frequency) and 580 mA (high frequency) to stop oscillating. Adjusting the current through the main coil from 430 to 550 mA produces a resultant CW frequency at whatever current setting you stop at between the stated limits.

Frequency adjustment of the YIG oscillators is linear and proportional to the magnetic current. My YIG, with a frequency range of 8 to 12.4 GHz and current requirement of 400 to 600 mA, was made by YIG-TEK. Frequency adjustment (magnetic) sensitivity is about 40 mA per GHz. Power output from YIG oscillators can typically vary from 10 to 100 mW. There are types of YIG's available that are not used in oscillators but rather couple in and out of the resonant sphere, or several spheres, forming a very wide-range tuned filter.

Probing the YIG

An ohmmeter revealed that the high current coil of my YIG-TEK 10 GHz measured 15 ohms. The DC bias input (oscillator and amplifier transistor power circuit) showed a high resistance and capacitor-charging characteristic. My YIG had a heater circuit of 100 ohms for the crystal.

The YIG crystal can have an additional, smaller coupling loop as the drive coil for modulation (the FM coil). It is 90 degrees offset to the oscillator coupling coil, and adds to the main coil's magnetic field.

The (oscillator) coil is coupled to the sphere and provides input to a single transistor-oscillator stage. In turn, the transistor drives a second-stage amplifier for higher output, as well as providing isolation to the oscillator stage, which reduces frequency pulling on the oscillator. Most YIG oscillators and filters are quite small, and use SMA coaxial connectors for RF connections.

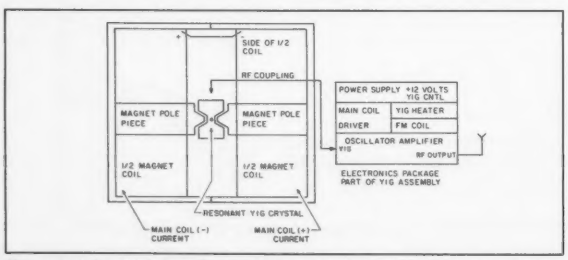

Figure 1. YIG oscillator details. The YIG crystal, 1/100" in diameter, is positioned close to magnetic pole pieces.

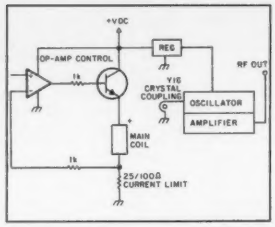

Figure 2. Basic YIG drive control circuit.

Power input to my YIG was via a DB-9 connector for all pinouts, making DC testing easy. The power connections are as follows: pin 1, +15V; pins 2 and 9, ground; pins 4 and 5, heater coil; pins 6 and 7, main high current coil; and pin 8, the FM coil input for modulation.

"This compact ramp generator has multiple applications."

Some high precision types, perhaps designed for extreme conditions, have a heater in the cavity to maintain a stable environment for the YIG crystal. You don't have to connect this heater for microwave operation.

The circuit to drive a YIG includes your basic power supply with features to provide fine control. It can be made to sweep over the YIG's entire range, or be a CW source at a spot frequency. If you use it as a CW source, place a large electrolytic capacitor across the main magnet coil. The magnet coils are resonant at a very low frequency (below 30 kHz), and anything that helps swamp out the low frequency resonance improves stability. Glen N6GN gave me this little trick, and it really improves CW operation. (See Figure 1.)

John W7HQJ was willing to share the YIG driver circuits, which he assembled from multiple sources. John used three different YIGs in his sweep oscillator, which covers a broad frequency range of near-DC to 10 GHz: 0–2 GHz, 2–6 GHz and 6–10 GHz. While you might not build John's sweeper, with minor changes you can adapt his circuitry for a single YIG at any frequency.

The frequency range of 0 Hz–2 GHz is actually obtained from the 2–6 GHz YIG oscillator by limiting the sweep to 2–4 GHz and mixing a 2 GHz fixed oscillator, therefore producing a low mix product of DC–2 GHz. Of course, a small area from 0 to some MHz is not usable, due to rest frequency leakage in the RF filters. This arrangement might not give competition to Hewlett-Packard, but for our use it works just fine.

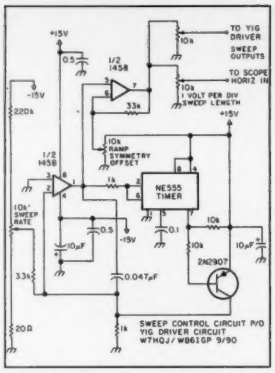

Figure 3. YIG sweeper circuit from W7HQJ.

The Sweep Ramp

This month I will go into the construction of the sweep ramp portion of the circuit. It provides sweep to both the YIG power supply control circuit and the oscilloscope horizontal drive external input. It only requires two op amps, a 1458 dual op amp, and a 555 timer chip, mounted "dead-bug" style (top of the IC glued to the board with the pins sticking up) on a single piece of PC board. The layout is helter-skelter, but easy with a little practice. Try not to stack up components one on top of the other; route leads between components in an orderly manner.

I usually start by soldering the ground pins to the foil, then adding bypass capacitors to ground on the power pins, giving the chip a support structure. Next I add secondary chips and inter-stage components between chips. You can develop a breadboard in a matter of minutes for testing. If the circuit is simple and the chips inexpensive, the breadboard might just be the final product!

This compact ramp generator has multiple applications. It offers clean sweep ramp, minimal noise output, good DC bus decoupling, variable sweep rate, adjustable offset voltage, and an output attenuator for driving an oscilloscope horizontal circuit. The YIG driver will work with almost any current range YIG. John mentioned that he has used this circuit with YIGs requiring from 60 to 800 mA.

The sweep ramp generator provides adjustments for variable sweep rates in sync with both outputs, one for the YIG driver and the other for the horizontal input of your oscilloscope. Controls for ramp symmetry and sweep length are also provided. Pin 7 of the 1458 op amp couples to both the oscilloscope's input and the power supply drive circuit. It is capable of producing a sweep ramp of +14 to −14 volts DC. A typical drive circuit is shown in Figure 2. Full details on this part of the circuit will be covered next month.

As always, I will be glad to answer any questions related to our VHF/UHF microwave bands or similar topics. Please send a SASE for prompt reply.

73's, Chuck WB6IGP

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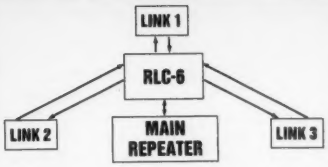

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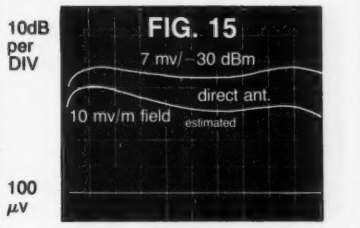
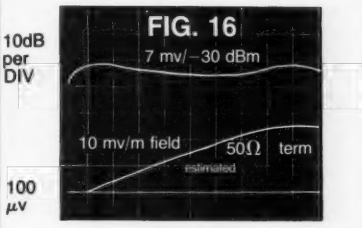


A 10" piece of #18 bus, with a female contact from an appropriate connector, extends straight from the probe's pin. Fig. 15 shows the probe output when this assembly is exposed to a 10 mV/m field strength. Also recorded is the probe output when fed by a terminated voltage source of 7 mv/–30dBm. Tnis nearly constant antenna factor (≈ 15dB/m) and high sensitivity allows calibration of the probe to read field strength and is permitted by the high impedance of the Spectrum Probe®.



If, however, the input impedance of the analyzer is altered by the addition of shunt 50 ohms, the reduced sensitivity of fig. 16 results. (This system is not FCC certification accuracy, primarily due to vagarities in the ground plane, polarization and near field control.) The shielded pair connecting the Spectrum Probe® and scope (and wall transformer) may be extended to allow probing the field at least 50' from the scope.

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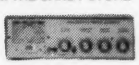

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Avoiding the Slammer

Last Saturday night, I fell into the dragnet again.

WA6OPS and I, with ride-along observer Phil Gray KJ6UV, were cruising through downtown Fullerton. We had lost the hidden transmitter's 2 meter signal upon our descent from the starting hill, but that's not unusual. It was probably at least 20 miles away, and we planned to follow our original bearing until we got in range.

Hider Wes Printz KA3DSE announced on the 220 MHz coordination repeater that he would raise the hidden transmitter power briefly for a couple of late-arriving hunters. Good, maybe we can get another fix.

Wait a minute! What are those flashing lights behind me? I'm being stopped by the police!

Two cruisers were behind me as I stopped in a nearby parking lot. The officers were smiling as they approached the van. They flashed their lights all over the inside and outside as I offered my license. What a time for this to happen—there goes our chance to get another bearing.

These wide-eyed cops were the youngest rookies I had ever seen. They looked just like the Police Explorer Scouts we see doing traffic control duty at public service events. They seemed to be in awe of the 4-element quad on top of the van, with the mast going through the roof.

"What did I do?" I asked, as April offered one of them a copy of my T-hunt information sheet.

"Nothing," was the reply. "We just wanted to see if you had a scanner in there."

"Why?" I asked, silently wondering if he recognized the Regency MX-7000 on top of the dash, hooked to the Roanoke Doppler DF box. It has only ham frequencies in it, of course. (Well, mostly.)

"We've had a lot of burglaries," the neophyte cop says, "and it's illegal to have a scanner in your car."

That was my cue to give him a friendly briefing on the fun and usefulness of competitive radio direction finding (RDF). I also pointed out that we weren't listening to his frequencies, but it would not be illegal to do so in California. One of them disappeared for a minute. After a check on the radio with the Watch Commander, he sheepishly admitted I was right about the scanners and sent us on our way. Well, at least now we had a good excuse for finishing second in the hunt.

Getting stopped in the city during a T-hunt is very unusual here in laid-back Southern California, where VHF hunts have been going on for 35 years or so. Veteran officers are used to our strange antenna arrays and slightly erratic driving. They give friendly waves as they pass by the hilltop starting points lined with hunters' vehicles, and usually ignore the fact that a couple of them protrude into the traffic lanes. Normally, it takes something blatant to get them to pull you over—like the hunter who backed down a freeway on-ramp a few years ago.

It was different in the early days. Ken Walsh K6ZRL remembers the 2 meter hunts of 1960, complete with Gonset Communicators and dynamotor B+ supplies. One night, he and several other hunters found themselves under arrest, albeit briefly. They weren't doing anything illegal, but a homeowner had complained about the strange people with radio gear tramping through the countryside. One hot-shot officer crashed his patrol car in the fog during that caper.

Worried residents still call in, but now dispatchers call the helicopter patrol to check out the scene. Several times, my hiding spots have been in the spotlight from above. Usually Angel (that's what they call the chopper) hovers just long enough to give away the spot to the close hunting teams (drat!), and then disappears.

Occasionally, it gets dicey. Four years ago, April and I hid at the site of a new home that was being built in Anaheim Hills by its owners, a couple of our friends. These folks discovered at the last minute that they couldn't be there to hide with us. We decided to go ahead anyway.

After a dozen hunters converged on the place, it wasn't long before the chopper and spotlight arrived, followed shortly by a patrol car. The neighbor who called in came over to insist that we were trespassing. We had no proof that the owners had given permission. There was a hurried autopatch call to the owners—no answer. Eventually we prevailed, but we learned an important lesson: When hiding on private property, be able to prove that it's okay to be there.

By the way, that was a great hunt from a technical standpoint. The AC wiring for the house was complete, except that there was no breaker box, and no lines to the power company. We connected the output of the fraction-watt transmitter to one of the long Romex cables, then buried the transmitter next to the foundation (see Photo A).

You have probably seen the ads: "Turn all your house wiring into a giant antenna!" That's just what happened. Everyone DFed their way to the house with no problem. Then they wandered around the property for hours trying to identify the antenna. (No wonder the neighbor panicked.) "All the outlet boxes sure are hot," they kept saying. Yup.

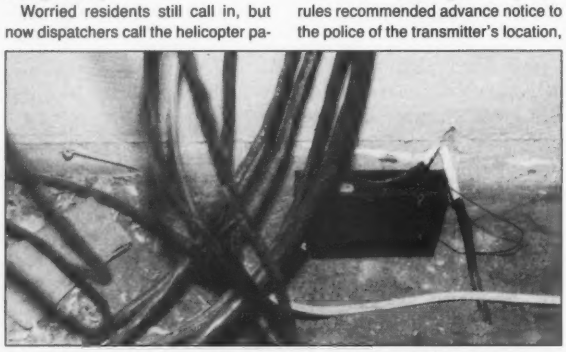

Photo. We've hooked the house wiring to the mini-transmitter's output, and now we'll bury it next to the foundation. It's going to be a great April Fool foxhunt.

Befriend a Cop

Consulting with the authorities ahead of time can pay dividends. One night we hid the little rig in an outhouse (that's right, a rent-a-biffy) in a new construction area in Yorba Linda. While setting up, we made friends with the security guard at the site. He got so enthusiastic about our prank that he let us use one of the vacant houses as a lookout post and hide our car in its garage.

For a while, Orange County hunt rules recommended advance notice to the police of the transmitter's location, so the dispatchers could reassure concerned citizens who called in to report strange sightings. That practice didn't last long. It was a lot of bother, and there was suspicion that advance hiding spot information was finding its way to some of the hunters. (I think I would have been tempted to "plant" some false stories when hiding, to see what happened.)

Certainly there are enough hams with police connections to make me think twice before disclosing my clever hiding spots. It was only two years ago that Don Lewis KF6GQ put on a hunt with the low power transmitter in a box under the reception desk at the Monrovia Police Station! All the bearings from every outside corner of the building pointed inside, of course. But, it took a lot of courage to walk through the door with a handheld "sniffer" to probe the lobby of a precinct house.

Get the Burper

Peace officers depend on their radio equipment, so they should be able to appreciate the need for RDF. Dean Hale KF7CR sent in a clipping from the Eugene (Oregon) Register-Guard, describing the antics of "The Belcher," who has been annoying the users of police and tow truck radios in 11 communities in the Monongahela Valley of Pennsylvania. He has whistled, made body sounds, and even played "Jingle Bells" on a kazoo.

So far, "The Belcher" has managed to elude DFers from the FCC's Philadelphia field office. Pennsylvania T-hunters, are you listening?

200 Hunts a Day

Bob Howle WA4ZID has an idea how T-hunters could perform a public service, save taxpayers' dollars, and add to our foxhunting fun, all at once. It all started when he discovered a 6" x 6" x 18" box in deep woods on his 20 acre property. It turned out to be the electronics package from a weather balloon.

Later, Bob had a chance to visit the National Weather Service (NWS) office in Jackson, Mississippi. He learned that two NWS offices in each state launch radiosonde weather instruments daily at 1100 and at 2300 UTC.

Bob writes: "These instrument packages are carried aloft by a helium-filled balloon and can attain an altitude of around 96,000 feet. Telemetry is transmitted back to a receiving station by an on-board transmitter that operates near 1680 MHz."

"To me," continues WA4ZID, "this translates into 200 opportunities per day to T-hunt! By finding and returning the radiosonde packages to the weather service for reuse, we could all do our part to reduce government spending (or at least get some enjoyment from same). Another benefit to DFing radiosonde transmitters would be that no one has to hide the transmitter."

Bob goes on to ask for information on directional antennas and receivers suitable for DFing these balloon-borne rigs. He suggests using a downconverter driving a 2 meter receiver. Perhaps a 1.2 GHz ATV converter could be modified for this purpose. [Ed. note: Radiosondes have been successfully DFed using a R-7000 in wide band FM mode and a small beam or dish.]

DFing transmitters, as they fall from the sky, can be an exciting challenge, as *73*'s editor, Bill Brown WB8ELK, and those who have participated in his ATV balloon experiments, can attest. The NWS radiosondes transmit a 400 mW AM or wideband FM telemetry signal to quarter wave vertical whip.

After the balloon reaches maximum altitude, it breaks and the payload parachutes back to Earth. This descent period (30–45 minutes) is the optimum window of opportunity for RDF. The range of a low power transmitter at 1680 MHz is limited once it hits the ground, unless you are lucky enough to be DFing from an aircraft. The batteries last about 3 to 4 hours, so you should have about an hour or two to locate the sonde.

So Uncle Sam is hiding transmitters for us. But radiosonde hunters (R-hunters?) will have to get a fix and get within "sniffing" range before impact. What a challenge! Do you think it's worth trying? Let me know. 73

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RS-4L	3	4	3½ x 6⅛ x 7¼	6
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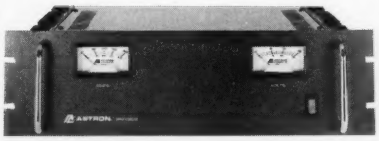

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RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
RM-60A	50	55	7 × 19 × 12½	60
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50
RM-60M	50	55	7 × 19 × 12½	60

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RS-4A	•	•	3	4	3¾ × 6½ × 9	5
RS-5A		•	4	5	3½ × 6⅛ × 7¼	7
RS-7A	•	•	5	7	3¾ × 6½ × 9	9
RS-7B	•	•	5	7	4 × 7½ × 10¾	10
RS-10A	•	•	7.5	10	4 × 7½ × 10¾	11
RS-12A	•	•	9	12	4½ × 8 × 9	13
RS-12B		•	9	12	4 × 7½ × 10¾	13
RS-20A	•	•	16	20	5 × 9 × 10½	18
RS-35A	•	•	25	35	5 × 11 × 11	27
RS-50A	•		37	50	6 × 13¾ × 11	46

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• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46

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VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
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RS-10S	•	•	7.5	10	4 × 7½ × 10¾	12
RS-12S	•	•	9	12	4½ × 8 × 9	13
RS-20S	•	•	16	20	5 × 9 × 10½	18

*ICS—Intermittent Communication Service (50% Duty Cycle 5min. on 5 min. off)

CIRCLE 16 ON READER SERVICE CARD

QRP

Low Power Operation

Mike Bryce WB8VGE
2225 Mayflower NW
Massillon OH 44646

The Universal Transmitter

If you have been keeping up with the QRP column these last few months, you should have two very useful pieces of equipment in your shack: the T/R controller and perhaps a Drake receiver capable of receiving some WARC bands. All you need now is a universal transmitter. Well, don't you know, that is exactly what we'll be building this month.

The transmitter is a lot different from some of the designs I've had in the past. It features five active transistors, your choice of either VXO or crystal control of the transmit frequency, a keying transistor for easy hookup, and three-stage output filtering for a really clean signal.

Most of the parts are easy to obtain. In fact, a lot of them can be purchased from your local Radio Shack store. The only problem parts will be the toroids. You can mail-order them from several companies advertising here in *73 Magazine*. There is plenty of room for substitutions of parts, so you don't have to sweat too much if you don't have a 47 pF cap. A 33 pF will work just as well. Just don't get too carried away when changing part values. The only values you should not mess with at all are output filter capacitors, of course. Not unless you want to change bands!

Output and Coverage

The transmitter will cover 3.5 to 21.0 MHz with no problem. Ten meters might be some trouble if you get a soft crystal. VXO of the crystal is possible, the only restraint being that you MUST isolate the VXO capacitor from ground. This requires an isolating mount and coupling shaft. Junk box stuff will work great. I'll tell you how I did my mounting in a little bit.

The transmitter will produce about 1.5 watts of RF. A little more or a little less, depending on supply voltage, crystal activity, and band. The lower frequencies will produce more bang than the higher frequencies because of the gain of the transistor used. My version of the transmitter drew 220 mA of current at 12.5 volts. At the time, I was using an old FT-243 crystal on 40 meters into a 50 ohm dummy load.

Four Stages

Let's look at how the universal transmitter works. There are four stages to the transmitter. An oscillator, a buffer, a driver, and the final or PA stage.

A Pierce oscillator is built around a bipolar transistor. Simple and very easy to get running. In fact, I changed a lot of the values in the oscillator and the thing still worked. The only critical part is the coupling capacitor to the buffer. You don't want to use too large a capacitor here or you'll load down the oscillator to the point of stopping it.

The next two stages, the buffer/driver, work together. Again, simple bipolar transistors are used. Transistor Q2 has some negative feedback to keep things stable. Emitter current is limited by the 100 ohm resistors in each emitter lead. The buffer transistor Q2 has an extra 10 ohms to keep the gain down a tad. Voltage to Q2 is supplied via the 250 µH choke. You can use either a commercially-made choke—any of the Miller mini-series will work here—or you can wind your own. To do this, use 18 turns of #28 on an FT37-43 toroid core. The small resistors in the supply line to both Q2 and Q3 act as cheap RF chokes.

Both stages are turned on via Q5, a PNP switching transistor. Grounding the base lead turns on the transistor and applies +12 volts to the buffer and the driver. The oscillator runs all the time and is not keyed. The 0.1 µF capacitor on the base of Q5 softens the keying. You can add to or reduce the value of this capacitor to suit your liking. The transmitter keys very well with the value shown, but it may be a bit too soft for some people.

The driver can be configured as either tuned or broadbanded. If you include the 10–60 pF trimmer on the collector of Q3, you can tune the stage for maximum power (with the best CW note). As you might well know, changing bands will require changing the number of turns, and the core type, if you go with the tuned circuit. On the other hand, if you leave the capacitor out of the circuit, and keep L4 and L5 (L4, 35 turns #26; L5, 4 turns #26) as is, the circuit is quite broadbanded. To change bands is really easy. Just change crystals and output filters.

The PA is simple and easy to get running. A 36 volt zener diode keeps the PA transistor from being zapped should the antenna not be connected to the transmitter. A three-pole filter provides excellent filtering of the output signal. RF decoupling is provided by the combination of RFC3 and the associated capacitors. The 100 µH RF choke is an off-the-wall part from Radio Shack. Without question, you could dig out the calculator and number-crunch the values and come out with an exact value of the RF choke. However, the one specified works fine.

Construction is easy, thanks in part to the fine PC board from FAR Circuits. The single-sided PC board shown here will operate just fine. The FAR board has a top ground-plane side to add a little extra stability. When using the FAR PC board be sure to connect the ground points together on both sides. Use what you have in the junk box. My PA transistor came from an old junk box CB.

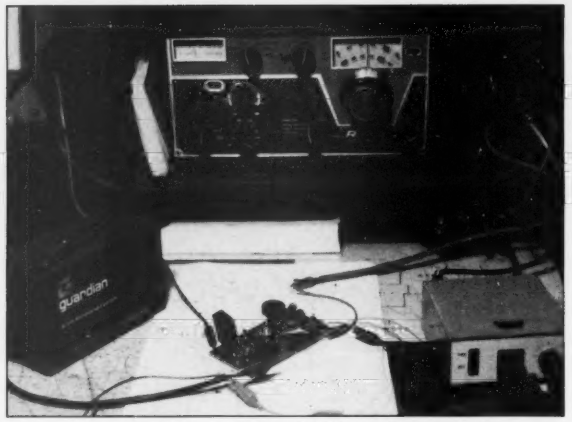

Photo. The universal QRP transmiter.

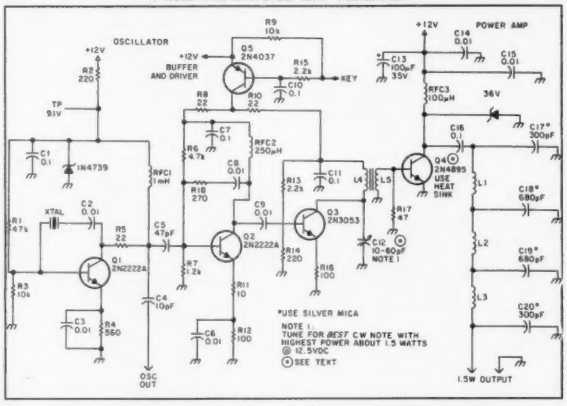

Figure 1. Schematic diagram of the universal QRP transmitter.

First, the Oscillator

If this is your first transmitter project, go slow and check each stage before going on to the next. There is little to gain by troubleshooting the entire transmitter if you can't get the oscillator to run. So, build the oscillator first. Stuff the board with the parts surrounding Q1. Connect the transmitter to +12 volts, and with the spot switch closed, check for 9.1 volts at the junction of the zener diode and the 220 ohm resistor. If all is as it should be, add the crystal. By using either a frequency counter coupled to the collector of Q1 (or taken from the 10 pF capacitor at the junction of the 22 ohm resistor and the 47 pF cap), or the station receiver, listen for the crystal's frequency.

Continue with the buffer/driver stage. Check for +12 volts at the collectors of both Q2 and Q3 when applying a ground to the key jack. Stuff the board now with the PA transistor and the output filter. With the output terminated into a 50 ohm dummy load via a QRP wattmeter (you do have one, don't you?) apply +12 to the board and

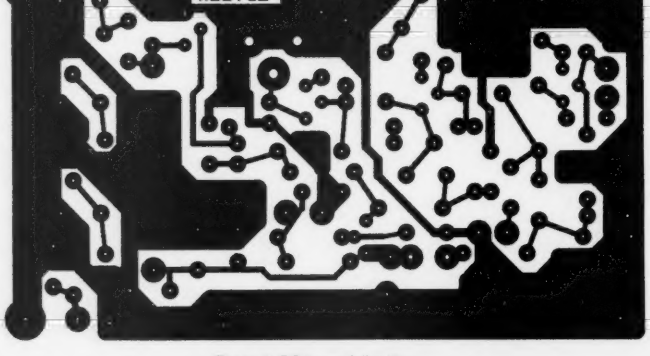

Figure 2. PC board foil pattern.

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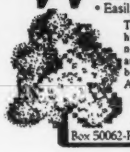

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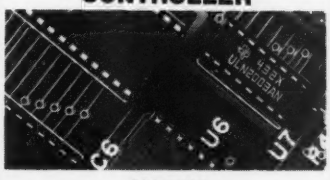

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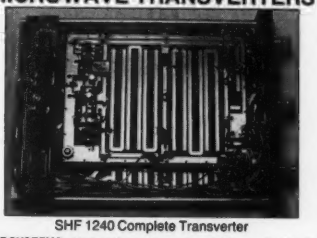

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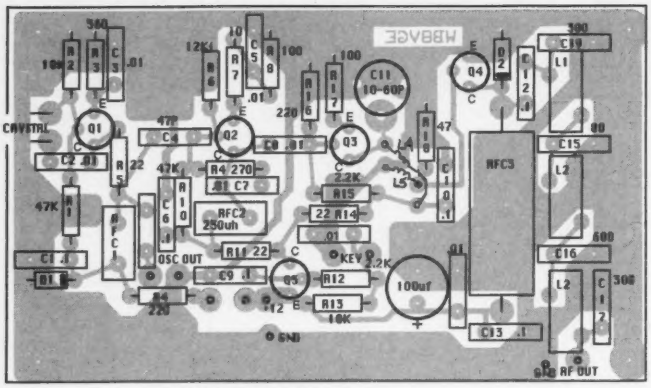

Figure 3. Parts placement.

key the transmitter. Using an insulated tuning tool, tweak the trimmer capacitor on the collector of Q3 until you have some power showing.

Don't go for max power, but rather for best power out with the best sounding tone. With a little bit of luck, you'll have about one watt or so of RF. Listen to the signal in the station receiver. It should be nice and clean without chirps, buzzes, or other noises.

If you built your version broadbanded, there will be no trimmer cap to adjust. Just add a crystal and go.

Receiving Adjustments

Before we run off this month, some notes about the transmitter. Since the oscillator is running all the time, you can hear the oscillator in the receiver. This makes it nearly impossible to hear a station calling us. So, the T/R controller will supply the +12 volts to the oscillator when you hit the CW key. If you are not using the T/R controller featured in the February issue, you need some means of turning off the oscillator during receive. For spotting the transmitter, a switch passes +12 volts to the oscillator. You can zero-beat to this signal without having to put a signal out on the band.

The small coupling capacitor from the oscillator can be used to couple a frequency counter to add a digital readout. Or you can use this output for a direct conversion receiver. Just route this signal into the mixer of the DC receiver and you're on your way to a transceiver.

To VXO the transmitter, add a 365 pF variable capacitor in series with the crystal. You don't have to remove the 0.01 µF capacitor from the board, since it seems to work the same with or without this capacitor. If you do remove it, you must place a jumper in its place. The capacitor MUST be isolated from ground. A small piece of plastic will work. The capacitor shaft must also be isolated from ground. I used a coupling shaft and a ¼-inch plastic rod. The main VXO tuning knob is connected to this plastic rod; not fancy, but it works!

All and all, this is a very nice transmitter to build and get running. The second version I built with the parts I found on the workbench netted me three states on 30 meters in less than 15 minutes. All the switching was done by the T/R controller. I added a small relay inside the transmitter to switch in two different crystals. The VXO gives me about 5 kHz of movement. That's not much, and I'm sure it's the fault of the crystals.

One final note. After four years of work, the *HW-8 Handbook* is done!! Completely re-worked with lots of new modifications for the Heath HW series of QRP radios. Lots of new modifications for the HW-9. To get your hands on one, send $7.95 ($12.95 for DX airmail) to me at the address above. 73

Parts List

XTAL	40m frequency	R7	1.2k ¼W resistor
Q1,Q2	2N2222A transistor	R11	10 ohm ¼W resistor
Q3	2N3053 transistor	R12,R16	100 ohm ¼W resistor
Q4	2N4895 (or 2N3866)transistor	R13,R15	2.2k ¼W resistor
Q5	2N4037 transistor	R17	47 ohm ¼W resistor
D1	9.1 volt zener diode	R18	270 ohm 1.4W resistor
L1,L3	17 turns #22 wire on T50-2 toroid	C1,C7,C10,	0.1 µF ceramic capacitor
L2	19 turns #22 wire on T50-2 toroid	C11,C15,C16	
L4	35 turns #26 wire on T50-2 toroid	C2,C3,C6,	0.01 µF ceramic capacitor
L5	4 turns #26 wire over L4	C8,C9,C14	
RFC1	1 mH RF choke	C4	10 pF ceramic capacitor
RFC2	250 µH, 18 turns #28 on FT37-43 toroid	C5	47 pF ceramic capacitor
		C12	10–60 pF variable capacitor (* see text)
RFC3	100 µH, R.S.# 273-102		
R1	47k ¼W resistor	C13	100 µF/35V electrolytic capacitor
R2,R14	220 ohm ¼W resistor		
R3,R9	10k ¼W resistor	C17,C20	300 pF silver mica capacitor
R4	560 ohm ¼W resistor	C18,C19	680 pF silver mica capacitor
R5,R8,R10	22 ohm ¼W resistor		
R6	4.7k ¼W resistor	Misc: XTAL socket case & hardware	

Note: All values indicated are for 40 meters. Values for other bands will be listed in next month's column. A double-sided blank PC board is available for $6 + $1.50 postage from FAR Circuits, 18N640 Field Court, Dundee, IL 60118.

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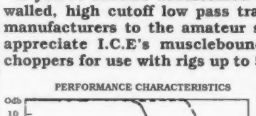

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Better yet, the brute-tough, robust construction of 420 series units mean long term dependability for serious operators and station owners. Both filters are built in split rectangular chassis, mill-finished 1/8" thick aluminum with 1/4" thick RF containment walls. Feed through fittings are machined from teflon TFE. Capacitor sections sheared from Phosphor-Bronze plate stock, smoothed & finished, and also Teflon insulated (421). Through coils wound from 3/16" copper tubing.

Both units feature all stainless steel ground fittings and constructon hardware, have extended bottom plates for mounting, and are individually boxed with mounting screws, slip-off connector covers, and manual.

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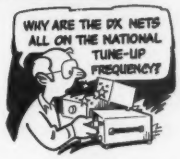

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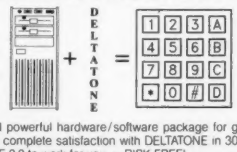

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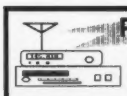

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Notes from FN42

Ah! April has finally arrived. Here in New England that means we've made it through the winter and have come into the "mud season." It also means that it's time to start working on the antenna projects we've been planning all winter. And soon, Bill Brown WB8ELK, our resident ham balloonist, will be preparing for more balloon launches from the 73 *parking lot* [A sure sign of spring -the Ed.]. *Field Day is just around the corner, and the summer flea markets will be opening their gates.*

I hope those of you in the Southern Hemisphere, where summer is turning into fall, have had lots of fun with ham projects. If you did something special, why not write it up and send it to 73, *either to me or the editorial staff? You don't have to be a Hambassador to get your name in print. Don't wait until tomorrow, do it today.—Arnie N1BAC.*

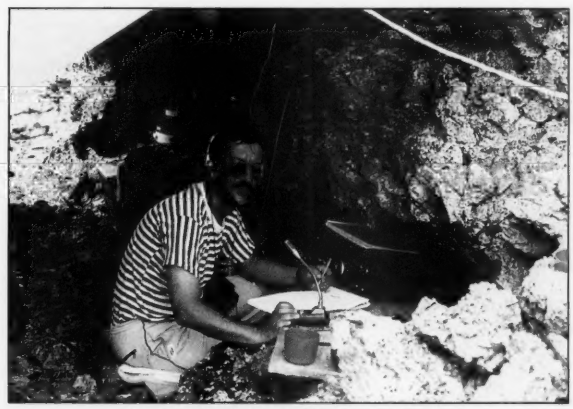

Photo A. HK4BHA operating the "top station."

DXpedition to Malpelo Island

Submitted by Ricardo Trujillo Velez HK4BHA. Last November some members of the Colombian Radio Amateur League went on a DXpedition to Malpelo Island. It took four days of hard work to pack the 10 tons of food, gas, generators, and amateur radio equipment.

The group onboard *Sebastian de Belalcazar,* a venerable ship of WWII vintage, arrived at Malpelo at 2 a.m., November 1, 1990, after 36 hours of travel. At exactly 0000 UTC on November 3, three of the planned five stations were operating. We continued operating until 1100 UTC on November 8.

On the steep side of the island, we set up the "top station on the rock" to take advantage of propagation toward the U.S. West Coast and Japan. As soon as Beto HK3DDD, Jorge KH6BDX, and Tibe HK4HHG turned on the IC-765, the JAs were booming. From that moment on, it was a solid pile-up (at times, 50 kHz wide).

Rigs used on the expedition were the IC-765, which performed flawlessly except for a blown fuse and an erratic keyer. The linear amplifiers used for 80 and 160 meters, Kenwood TL-922As, also worked fine, except for one of the 3-500Z tubes that developed a short and had to be disconnected. The TA-33M antennas were great. We lost part of one of them, and it became a TA-23M, but it still worked fine.

Ignacio HK3CC took equipment for satellite operation, including a HUGE box that contained all the antennas, fully assembled! Before getting on the ship, with a despairing Ignacio looking at us, we took the antennas apart and discarded two-thirds of the box.

When we had the satellite antennas set up, I tried to hit one of the repeaters on the Pacific coast, and after replacing a faulty connector on the downlink antennas and slowly turning the stack, I got an S-2 signal from 146.76 repeater at Horqueta mountain, near Cali, Colombia. With this link, we also had a big pile-up on the 2 meter band. Disobeying specific orders, I took my PK-232 with me, and had the opportunity to activate HK0TU on VHF packet.

After all the hard work, the results were just great! More than 40,000 QSOs. We worked 160, 80, 40, 20, 15, 10 and 2 meters. Modes were CW, phone, RTTY, and packet. We also worked OSCAR 13.

A week later, with the weariness slowly draining from our bodies, and the task of answering the QSL cards for more than 40,000 QSOs, we look back and ask: Would we do it again? The answer is definitely YES!

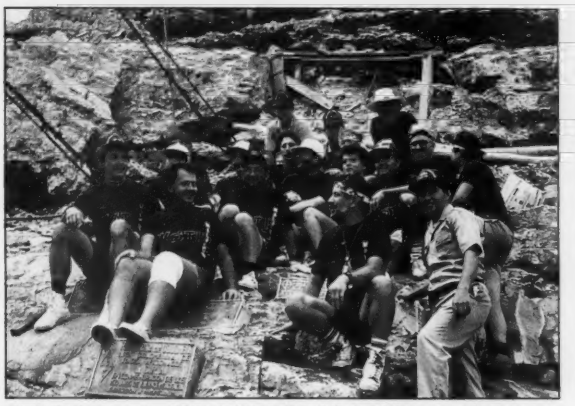

Photo B. On the rock at Malpelo Island. Top (left to right): two naval officers and HK4BHA; 2nd row: HK3CC, HK5LEX, HK4DUM, HK6HFY; 3rd row: HK3AHM, HK3DDD, HK6BDX, HK1KXA, HK1HHX, HK6KKK, HK3DPY; and front row: HK1LDG, HK4HHG, HK3BED, and naval officer.

BRAZIL

Carlos Vianna Carneiro PY1CC
Afonso Pena 49/701
20270 Rio de Janeiro
Brazil

Always Fascinating Trindade Island

In a lucky mood, Tino PT7AA and Karl PS7KM got the Navy's call to go to Trindade Island just two days before the Light House Ship, *Almirante Graca Aranha,* departed on the usual trip of every two months, with supplies; and with mariners to change half the garrison of about 40 on a four-month duty period there.

Gathering all equipment and antennas and whatever else, running to their local airports praying for an extra place left free, and getting to the docks three or four hours later than specified by the Navy, after a last minute repair, the expeditioners got onboard just in time . . . after a 10-month planning period!

After an 80-hour trip, there it was, Trindade Island, where Tino and Karl disembarked from the ship's helicopter . . . . Lucky mood, as we say . . . .

We took our luggage to the meteorological station, the usual operating site on the island, and mounted the equipment and antennas so that at 1236 UTC June 11, we were able to have our first QSO, on 28 MHz, starting our log with OK3CCC, with ZY0TW for Tino and ZY0TK for Karl.

As equipment, we took a Kenwood TS-130S, TS-430S, ICOM IC-725, two ground-planes for 10 to 40 meters, an inverted-vee for 10/15/20 meters, and another for 40/80/160 meters.

Even though the propagation was not so good, we were able to make 870 CW/SSB QSOs on 21 MHz, 809 on 14 MHz, and 560 on each 7 and 28 MHz, with 48 countries on CW and 57 countries on SSB. We would liked to have stayed longer, but the supply ship stays there for not more than two days, and we didn't feel that we could take two months, the time between supply ships, out of our busy schedules. So, radio amateurs have only six chances a year to get to Trindade Island, and those going on these trips are based on a waiting list. The waiting list is enormous with scientists, biologists, sociologists, oceanographers, and so on.

But afterall, if you get to Trindade Island, you'll have something really unforgettable to remember as long as you live. By the way, Trindade Island is also IOTA-SA 10 for the Islands On the Air Award.

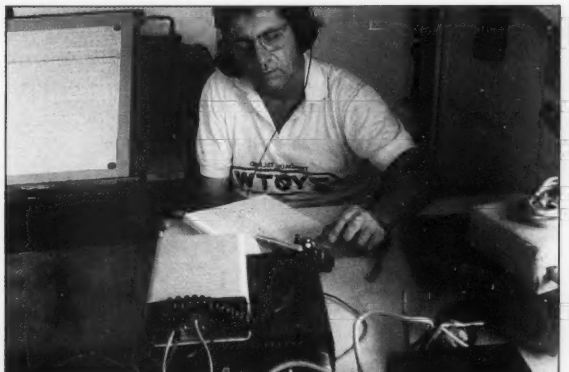

Photo C. Tino ZY0TW at the key on Trindade Island, June 1990.

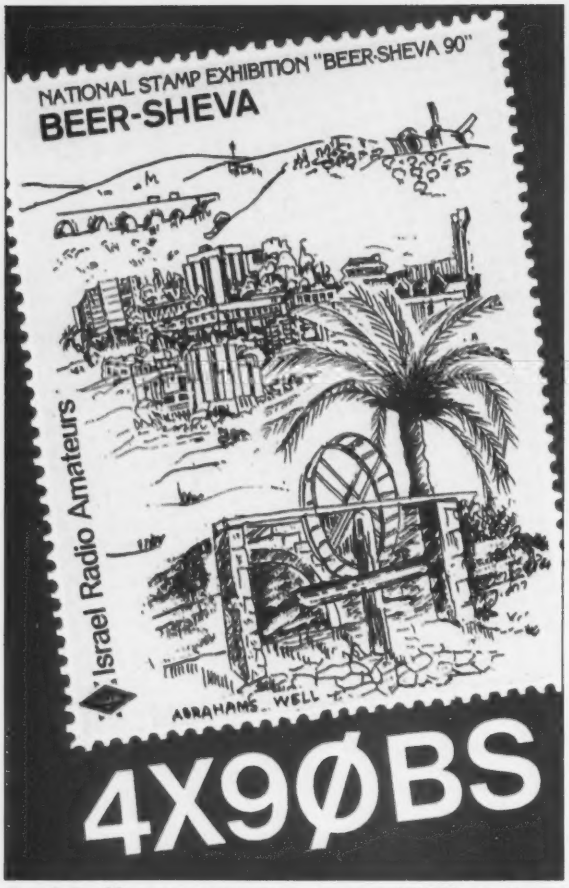

Photo D. The QSL card commemorating the operation of 4X9ØBS at the National Stamp Exhibition in Beer Sheva, Israel.

Photo E. Some of the operators at 4X9ØBS. Rear (left to right): 4Z4UT, 4Z9GAG, 4X6YY, and 4X6EA; front: Ziv (SWL), 4X6DE, 4X1MK (73 Hambassador), and 4X6YY's son.

ISRAEL

Ron Gang 4X4MK
Kibbutz Urim
Negev MPO 85530
Israel
Packet: 4X1MK @ 4Z4SV.ISR.EU

4X9ØBS at the National Stamp Exhibition

During the Succoth holiday season this past fall, for eight days, Beer Sheva, the capital of the Negev, hosted the National Stamp Exhibition, an event of importance to every philatelist. 17,000 visitors graced the heavily guarded show of 3 million dollars worth of exhibits, which included rare stamps, the history of mail, and collections according to themes. Although not a stamp collector myself (I pass stamps from my QSLs to my wife's parents) *[Joyce at 73 gets mine from my letters!—Arnie]*, I was duly impressed by the scope of the displays.

The exhibit was opened by the Minister of Communications, the Mayor of Beer Sheva, the general manager of the Postal Service, and other dignitaries. Each day a new stamp was issued with first day covers available on location, and a special stamp was issued to commemorate the event.

During the duration of the exhibit, special station 4X9ØBS was on the air. Approximately 5,000 of the visitors took the trouble to go upstairs to visit the station. They received a leaflet explaining amateur radio and inviting them to get in touch with the Israel Amateur Radio Club to join our hobby. Thirty-five amateurs visited the station, some of them leaving their QSL cards to decorate the wall.

Seven Beer Sheva hams kept the station going under the capable leadership of Shalom 4Z4UT, who must be commended for setting up the station and being on hand almost all the time. Four thousand QSOs were logged with stations all over the world. Band conditions were really hopping, as witnessed by contacts with California on 10 meters!

On the opening day of the exhibition, Minister of Communications Pinchasi visited the station, and was seated in front of the rig and photographed. Yehiel 4X6YA prevented him from speaking into the microphone, politely explaining to the Minister that only a licensed amateur may talk over the air! *[Looks like a new amateur candidate, Ron!—Arnie]* The QSL card depicts the old and new Beer Sheva, city of 130,000. At the top is the bridge over the Nahal Beer Sheva river bed, in the center ground is the new city, and in the foreground is the well of the Biblical patriarch, Abraham. This card is sent out in reply to all QSLs received. Those wishing QSLs sent directly, instead of through the bureau, should QSL via 4Z4UT and enclose return postage.

Wine Cellar Operation As in past years, during the Easter/Passover vacation, the Israel Amateur Radio Club is conducting a special 100-hour operation on all bands, on SSB and CW. This year, look out for stations operating from Israel's wineries! They will be on the air from Sunday, March 31, at 0600 UTC through Wednesday, April 3, to 1000 UTC. We expect three stations: at Golan Vineries in Katzrin in the North, Carmel vineries at Rishon Le'Zion, and the wine cellar of Zikhron Yaakov.

Special callsigns, unknown at present, will be used, and a certificate will be available for those working all three stations. As soon as final details are known, "73 International" will be notified. It is possible that a small sample bottle will go along with the award! *[Looks like many hams will be busy on the bands during those few days! Me too!]* 73

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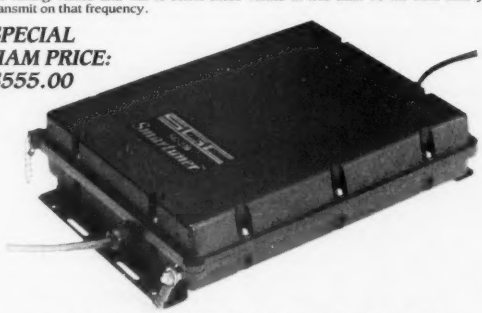

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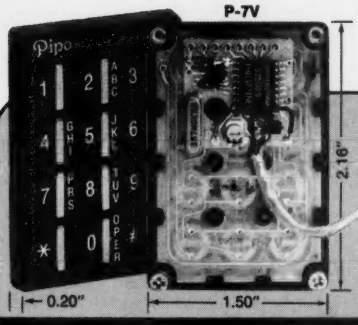

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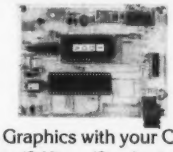

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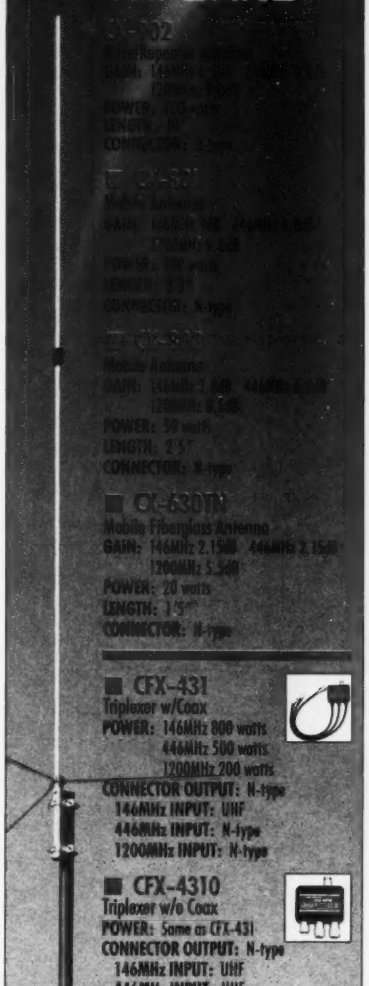

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Hamfesting!

Ah, at last spring is nearly here. Some folks love the warm weather, the twittering of the birds, or the new flowers thrusting eagerly toward the sun. But we hams know better—spring means hamfests are coming!

While a good hamfest has plenty of variety, including parties, forums and lectures, the center of attraction is always the flea market. For many, myself included, nothing in all hamdom feels as good as getting that great bargain. (And nothing feels as bad as getting it home and discovering that it's a disaster!)

Of course, it's also fun to sell off your own junque to make room for the new junque you're about to buy. So, let's take a look at these activities, from both practical and technical points of view.

It's Your Move

Hamfesting is like chess. You want to sell your stuff for a good price, and buy stuff as cheaply as you can. Of course, the other guy wants to do the same thing. But money isn't the only consideration.

Before you sell a piece of gear, ask yourself: Do I really want to sell this? There are plenty of reasons to sell something, such as:

1) I need the money to buy something else.
2) It doesn't work and I can't fix it and I don't want to pay to have it fixed.
3) I just don't use it anymore.

Reason number one is the worst one. If you like the thing, don't sell it, especially if it is not easily replaced. For example, I have an ICOM IC-202 2 meter sideband portable rig I got several years ago at a hamfest. Here in northern Vermont, there is practically no 2 meter SSB activity. I have made maybe three contacts on the rig in as many years. But 202s are getting quite hard to find, so I know if I sell it, I may never be able to replace it. Heck, I might not live here forever, and my next QTH could be brimming with VHF SSB. So, here it stays. Of course, if I didn't like the rig, that would be another story.

If you can't fix something and don't want to pay to have it fixed, then by all means sell it, but tell the truth, please. Don't say it works great when, in fact, it is deader than the proverbial doornail. Sure, some hams will be scared off by its nonfunctional status, but others will jump at the challenge, especially if the price is right. The majority of the stuff I buy at hamfests is broken and cheap. For me, fixing and using gear given up for dead is one of the most enjoyable parts of the hobby. In fact, I highly recommend it as a learning tool, if you're so inclined. Also, once you set it straight, you can turn around and sell it at the next 'fest, making a few bucks in the process.

If you have a nice radio but just don't need or use it, and you're sure you won't miss it, selling it might not be a bad idea. At some hamfests, you can get good money for nice gear. At others, though, nobody comes with large amounts of cash, so you may sit all day trying to sell an $800 rig. Before you waste your time, ask around about the nature of whatever 'fest you're going to.

By the way, you will have a much better time if you go with someone else, because one of you can watch your table while the other one goes scouting around. *Never* leave your stuff unattended. Hams may, for the most part, be honest, but some are not *that* honest.

How Much Ya Want Fer That?

Once you've sold your extra gear, your wallet should be stuffed, and you will want to get to the really fun part: buying. Sometimes, you go to the 'fest looking for something in particular, and other times, you just browse. Let's look at the different kinds of things you can buy.

Parts is Parts

If you home-brew or do much repair, you need to keep a stock of parts on hand. Sure, you can get some of what you need at Radio Shack, but you'll pay retail prices, and their selection of components is limited, so you may not find what you need. Hamfests are a great place to stock up.

Most of the larger 'fests I've been to have a few people selling parts from plastic bins. The parts are new surplus, and the prices are low, low, low. I've gotten everything from resistors and caps to FETs and ICs. Almost always, the parts have been fine.

Be wary, though, of surplus electrolytic capacitors, especially big ones. Take a good look at them before you buy. If they look old or corroded at all, steer clear. Those things just don't hold up well on the shelf.

You will probably also find some unusual parts, like air variable caps, toroids, waveguides, tubes, etc. Many of these parts have such a limited market that they have all but disappeared, even at mail order outlets. And, of course, if you need a specific part for an older ham rig, the hamfest may be your only choice.

By the way, I always go to the parts bins last, because the primary hamfest rule, "Grab it when you see it, or it will be gone," doesn't usually apply here.

Computer boards, especially expansion and I/O boards for IBM-type machines, are showing up more and more. Apple II stuff is common, too. Even hard disk drives are being offered, although I'd be leery, given their rather fragile nature. RAM ICs, floppy controllers and other roll-your-own computer parts, right on up to complete motherboards and whole machines, are in great supply.

Respect for the Dead

The other great source of hamfest parts, of course, is dead gear. There's always lots of that around. Sometimes, you can pick up an old, dead rig for $2 and get a $20 part from it! If you know what you're looking for, it's a great way to go. I often buy dead VCRs, because they are loaded with good stuff and can be had for as little as $5. Heck, the headwheels are worth 10 times that alone. Occasionally, I even fix the machines and use them, but they make great parts sources for coils, caps, Japanese transistors, motors, etc.

Once in a while, you can buy something really cheap for parts, and then discover that it is easily fixed! I once bought a 15 watt synthesized 2 meter mobile rig with a nice DTMF mike for $25. The seller said it "won't transmit," so I figured on a blown final transistor at best, and serious damage at worst. I expected to use it either for parts or perhaps just for the mike, but when I got it home, I discovered that the only problem was a dirty TX/RX relay! I cleaned it and have been using the radio with no problems for almost five years now.

> *"Hamfests are a great place to stock up."*

Need a tube? There are usually a few guys selling loads of them. You aren't likely to find a high-power transmitting tube (although it is not unknown), but there are lots of 12AX7s and the like to be had for very little cash. If you've priced tubes lately , you'll want to grab what you need at the 'fest. Some tubes may be new, but others will be used. Usually, the seller will be up front about that.

I Feel Lucky . . .

Buying a radio at a hamfest is always a risk. Unless you happen to know the seller, you have no idea what is inside. It could work fine, or it could be butchered and ruined by an incompetent service attempt. Typically, something will be wrong with it, but it may not be too bad. If you are technically oriented, it may be worth the gamble. If not, you are probably wisest to stay away. Naturally, if you can see the rig work, you know at least that it is not wrecked. Well, actually, not always. I once bought a walkie, at a fairly high price, after seeing it work. Ten minutes later it literally poured smoke out the bottom and died. The seller didn't care and wouldn't refund my money. Although his butcher job had mangled the radio, I ultimately rebuilt it to good-as-new status, but it was quite a mess, and I never would have bought it if I'd known. But such cases are rare. Usually, if it seems to work it probably does.

Look for obvious signs of sloppy tampering, such as stripped screws, solder burns, damaged cords, etc. Also, check to see if the rig is clean. If it is covered with cigarette residue (which is a sticky, yellow gunk), you can bet that the stuff is all over the inside, too. And, in my experience, heavy smokers tend to be the most careless with their equipment. I don't know why that is, but it seems to be so. As a general rule, try to stay away from dirty, abused-looking gear. A clean rig is more likely to be well maintained.

Ask if there's a manual included in the sale. Sometimes the seller will promise to mail it to you. He may do it, and he may not. I've bought some fairly expensive stuff and been unable to pry the manual from the previous owner. But I also remember a guy who spent $2 to send me the manual for a $5 purchase! What you want most, of course, is the schematic. If the rig is a common one, you can probably get it from the manufacturer or a local ham. If, on the other hand, you're buying a Hamatsitsi X-2900, made in 1974, you may be out of luck.

I'll Give You Three Shekels and a Lame Camel . . .

Bargaining is not the norm in America, but flea markets are an exception. Almost no one expects you to pay the asking price. If you have no idea what the gear is worth, ask around before you plunk your money down. If you really want the thing and need to decide in a hurry, you'll just have to wing it. You might get a popular, late model rig such as the FT-757GX for 10 to 30 percent less than the asking price. For an old, beat-up boat anchor or a dead chassis, try offering one-third and go from there. You'll be surprised at how often you can get real bargains if you're not shy about asking.

Although flea markets are sometimes called "swapmeets," very little actual trading goes on. Most transactions are for cash. But, sometimes a real trade can be had. If you've been unable to sell your own items, try offering them for what you want, especially near the end of the day. I once traded a color video camera, which had been sitting unsold all day, for a Macintosh computer. I then sold the computer 10 minutes later for exactly what I had been trying to get for the camera! Everybody went home happy.

Well, I know this month's column is a bit off my usual beaten path, but I hope this advice will help you enjoy the hamfest experience. If you've never been to a 'fest, you don't know true happiness until you've seen 8,000 people walking around with callsign hats and rubber duck antennas sticking out of their pockets. Enjoy! 73

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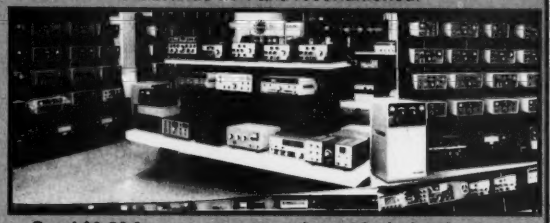

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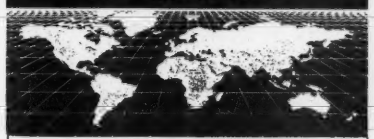

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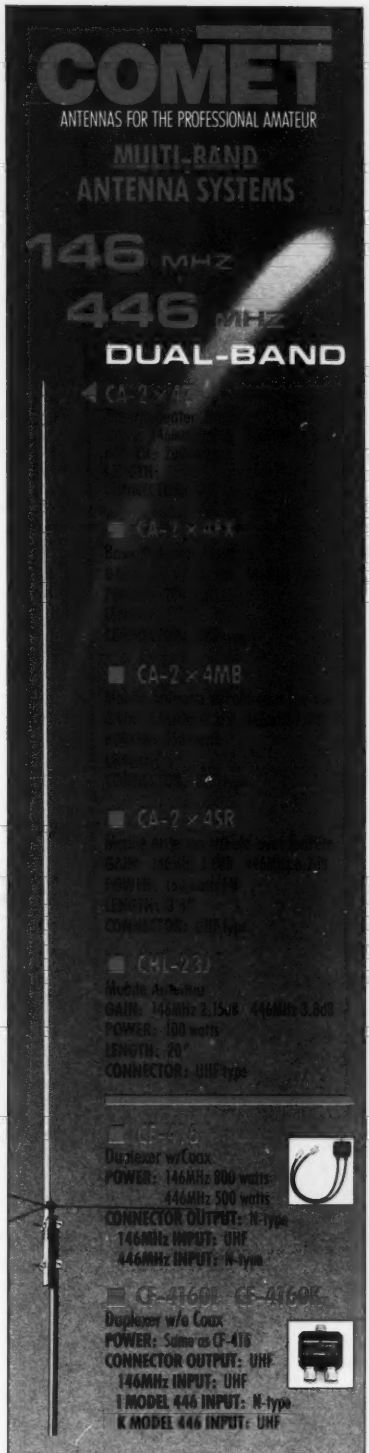

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Continued from page 4

While I'm sure that I'd have no problem in getting equipment donated, I'd rather see you pack up your own portable rigs and antennas that you know and take 'em over. This should be a people-to-people effort, not a commercial one.

Yes, of course I'll turn the promotional faucets on and make sure every newscaster is aware of what you're doing. With some good PR we might be able to attract tens of thousands of youngsters to amateur radio. At least we can make the general public aware that amateur radio exists and that it isn't just some kind of citizen's band offshoot.

I'm not talking CW or SSB here; I'm talking high speed message handling via RTTY and packet. We'll need stations on the American end in major Arab communities such as Brooklyn (NY), Lowell (MA), etc.

I've operated from the area—from Jordan, Lebanon, Syria, Iran and Afghanistan, so I'm familiar with the propagation. We should be able to relay messages from Iraq a good part of the day and night. We'll need some relay help from Europe part of the time. That's the nice part of digital communications—relaying is a snap.

I've initiated contacts with our government to see how interested they are in such an effort being organized and made ready for implementation. I think they'll like it because we're going to need all the people-to-people friendly contact we can make in order to cool off the Arab/American hostilities resulting from the war. Maybe you've noticed that the Palestinians aren't exactly cheering us on.

We'll need hams with laptop computers for message inputting. We'll need operators to keep the traffic moving around the clock. We'll need the capability to handle millions of messages, not thousands. I think we can do it.

My little Model 100 laptop would be fine for this action. It's simple to use—takes maybe five minutes to learn. It automatically counts message words and characters. It dumps to disk for message transfer to the rig's computer—probably another 100. Everything we need is small and portable enough to be carried over as luggage. I even have one Model 100 with packet built right into it.

If you're interested, let me know. In the meantime I'll see what I can do as far as working up the transportation and accreditation that'll be needed.

This will be the first real opportunity for us to provide a desperately needed high speed communications service—one which no other service can possibly handle—so I hope we're up to it. Not only can we do a lot of good toward repairing the war wounds and possibly helping ease general Arab/American tensions, but we can gain the visibility we need to assure our growth and preserve our bands. This could make the big difference we need at WARC in 1992.

How about the ARRL? Well, despite endless opportunities, they've never come through before, so it doesn't seem rational to bet everything we've got on their getting into action this time. When the big hurricane hit St. Lucia, the League never noticed. I packed up several suitcases of ham gear and sent 'em down with *73* editor Tim Daniel N8RK. Our effort helped the island get back on its feet.

I've got plenty to do without trying to organize an Iraq emergency communications system, so if the ARRL will actually do it—and will see that amateur radio gets the credit instead of the League—I'll be a solid supporter. I'm not going to hold my breath.

I'll be surprised if Baxter isn't all over this self-promotion opportunity with endless talk, reams of press releases and little action. We'll see.

My own agenda is to spend as much time as I can working toward my goals of improving independent music sales and getting a basic electronic educational course into our schools. It's just that this Iraq situation seems to provide an opportunity for amateur radio and America to both benefit.

Governments and bureaucratic organizations such as the ARRL tend to be difficult to get into action. When disturbed, they slowly move from the sleep mode to dither. If the pressure continues they'll move from dither to action. So we'll see. I want to see action, even if I have to do it. But that's a last resort.

How about you? Are you game for the adventure of your life? Or do I hear a bunch of throat clearing and foot shuffling? I noted that 95% of the Americans who signed up to go to Cannes for the recent music industry meeting canceled out in panic when the war started. Even class trips to Washington were canceled. Phooey.

Amateur radio provides many opportunities for adventure—opportunitites which are lost on most hams. Sad. There's adventurettes on mountaintop VHF expeditions. There's DXpeditions to Caribbean islands—even to tough ones like Navassa. Even hidden transmitter hunts and Field Day can be adventures.

It isn't the cost which is stopping most hams, for many of these adventures cost little. I explained how Sherry and I visited hams in Munich, Vienna, Krakow and Prague last year for under $1,000 complete. We've just gotten back from Cannes where we spent under $200 for everything, including the airfare, hotel and meals. No, it isn't the money; it's a shortage of the spirit of adventure that's keeping most hams at home.

How much does it cost to go on an African hunting safari? A fortune, right? Sure. Well, I talked two other adventurous hams into going with me on a two week safari in Kenya where we spent $690 each. We had a hunting trip none of us will ever forget. So how about a little visit to Baghdad, dad? It's a great city with beautiful mosques and a fascinating bazaar, if we haven't leveled too much of it. They'll really hook you on the taxi fares if you aren't careful, though.

Dayton? Again?

What is it that drives more than 30,000 hams to Dayton every April? Cars, trucks, motor homes, planes, RVs, motorcycles and even bicycles, that's what.

And what kind of homing instinct is it that forces otherwise crazy old men to drop everything in late April and home in on the Hara Arena on the outskirts of Dayton? What attraction is there that results in hundreds of convoys of vehicles, all sprouting weird antennas, heading in from all over the country?

Well, one attraction is the world's largest electronic flea market. There's everything there from 1920s' radios to WWIII surplus. Computer hackers have been known to lose bladder control over some of the hard disk bargains. It's a ham builder's heaven: parts, parts, used gear, modules, brand-new, old, ancient.

All the ham manufacturers are there, showing off their newest products. Ham dealers, with their razors honed, are ready to cut their competitors' throats. Their booths are hard to get to because there's always a swarm of fanatic price shoppers shuttling from dealer to dealer, working the price of some piece of gear down, dollar by dollar.

There's an ambulance on hand for hams who try dealers' patience beyond endurance . . . and for old-timers whose walkers have broken under the strain.

There are technical sessions for every imaginable facet of our hobby. The DXers get together and get their jollies over DXpedition videos. Indeed, one of the great attractions of Dayton is that it is the one big hamfest of the year where you can get together with others who are into your own special ham fetish.

The traffic handlers all reassure each other that it's everyone else that's crazy, not them. There's an ARRL forum which is oh, so carefully orchestrated so as not to allow any dissension to be evident. The MARS hams have in the past couple of years gotten together to commiserate over slackening military support. There's nothing like a nice war to perk up MARS, so this year we should see some smiling faces.

The slow-scanners, AMSAT, packet, RTTY, moonbounce and other groups all caucus at Dayton. The better heeled have hospitality rooms where they can get together and lie.

Yes, of course there's a Wayne Green forum. Every year a crowd gathers and I tell 'em the same thing. I explain how amateur radio is going to hell in a handbasket. Worse, I explain what happened to make it happen. You know, all the same things I write in my editorials. There seems to be no end of interest in my telling what I've written.

For some reason they keep coming back every year. Perhaps it's because they're all old and they need a memory refresh once a year to keep them going. Whatever it is, the Dayton Hamvention organizers tell me I pull the biggest audience of any forum every year.

If you'll let me know what you'd like me to talk about this year, I'll cover anything you like. I usually cover our slow growth and its effect on America. I explain what went wrong and who, exactly, did it. I then explain what we can do about it.

I do some blue sky about new technologies we can pioneer. We have so many possibilities for new modes that it's incredible. And the pioneers, if they do it right, can easily make zillions. I've personally known several youngsters who've done well recently . . . one is a billionaire now. Another is only worth a few hundred million. It's out there if you play your cards right.

I don't think you want me to get into any technical discussions of how electromagnetic fields can screw us up and increase our chances of getting a listing in *QST* (Silent Keys). Or an explanation of how the mind works, why it gets screwed up and how to fix it.

Sometimes I ask for a show of audience hands on various ham activities. How many are on packet? How many are DXers with over 300 countries confirmed? How many are active on 10 GHz? How many have been on a DXpedition? Things like that. It becomes obvious that we have a whole huge mansion of possibilities in amateur radio and most of us are living in one little closet and never even opening any doors.

This is why I sometimes may seem testy that over 40% of all hams have never even progressed to a General Class license. Yes, I've heard all the feeble excuses and rationalizations. Baloney. With kids of 10 making it through to Extra, we're not talking a rocket scientist achievement. Now why are you getting defensive when you know I'm right?

You know as well as I do that if you ever decided that you were going to go for an Advanced ticket, you could do it easily. It's like anything else—you have to make the decision, from there on it's easy. Decisions are difficult to make. I mean real decisions, ones you aren't going to change.

You can go on DXpeditions. You can lose 85 pounds. You can become an expert in a new technology. You can do this at 20, 40 or 60. You can become one of the best conversationalists we've got over the air. First comes the decision to do it. Then comes one heck of a lot of work. Nothing of value comes easy. And those of us who take the easy road end up with little of value . . . in skills or accomplishments.

Hey, we're in need of good rocket scientists, so how about taking up that business? You don't go to school for it, you have to learn it all by yourself—like almost everything else.

Oh yes, Dayton. It's a madhouse. 30,000-plus hams, all with HTs on their belts. Two meters is jammed solid from one end to the other. It usually rains a little while on Saturday, chasing 20,000 inside and packing the exhibit areas solid until the sun comes out

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SCALE selects an amplitude sensitivity of either 10 dB/DIV or 2 dB/DIV

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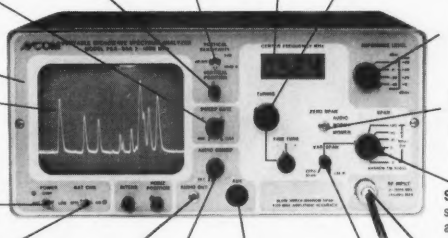

REFERENCE LEVEL adjusts input attenuator and IF gain. Calibrations in dBm and dBmv are provided.

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again. Good time to eat popcorn and maybe a sloppy Joe.

Drop me a line, a fax or even leave a note for me at the *73* booth and let me know what you'd like me to cover in my talk. It'll be from 1:00 to 2:45 on Saturday. Now ask me if that's AM or PM. If it was an ARRL convention it would probably be AM. I shouldn't complain, for many years they wouldn't let me even exhibit at ARRL conventions, much less speak.

If you haven't done Dayton, don't miss another year. It's one of those experiences you'll never forget. I'll be all over the place, so watch for me and say hello. Tell you what, ask me for a "Buck-Off" worth a dollar toward any of Uncle Wayne's stuff. I'll have a pocket full to help prod you into spending some money. And you aren't going to miss my talk, are you? It's right after lunch on Saturday, so you can catch a short nap.

Wayne Makes Mistake!

Well, it had to happen! After 40 years of writing editorials I finally made a mistake. Sure, I've got a whole bunch of feeble excuses and rationalizations. But it comes down to a dumb mistake.

In my January editorial I had a nice picture of the Mobile (AL) Amateur Radio Club that I took while I was there giving a talk. I put 'em to sleep once a year when I'm in Mobile for my yearly USS Drum submarine reunion. It's a great club and they're doing wonderful work in getting youngsters licensed.

From Mobile I drove to New Orleans to look for a spot to take a good picture of Scott Kirby for the cover of his second Greener Pastures CD release. From this I managed to mislabel my club photo as being in New Orleans. Wasn't. I don't even know if they have a ham club in New Orleans. I know they sure won't talk to me over the local repeaters when I check in.

Scott's still playing every day on the streets in the French Quarter. If you get to New Orleans, say hello and put something in the hat, boy. He'll be coming up here to New Hampshire soon to record his third CD in our new state-of-the-art recording studios.

Yeah, I've gotten into the record business. My Greener Pastures Records label has issued three CDs (and cassettes) so far...two of Scott playing Scott Joplin's music and one bluegrass. My Adventures In Music label has 11 releases so far and is gearing up to put out four a month. My Auditions label has one CD almost out and a bunch more in the works. The music business is great fun and it's growing fast, despite the recession.

Anyway, I hope the Mobile club members will turn down the fires under that vat of tar and forgive me for screwing up. 73

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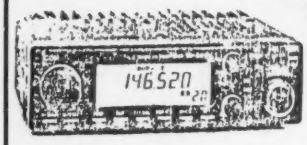

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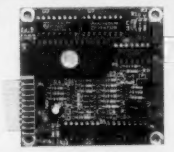

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ATV

Ham Television

Bill Brown WB8ELK
%73 Magazine
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How's the Weather?

Showing off the latest computer program or graphic creation has got to be one of the most popular ATV "programs." It's always fun to see the most recent computer goody displayed via ATV. Recently I ran across a computer program and service that really excited me since it incorporates a topic of great interest to hams: "the weather".

In previous columns we've talked about ATV repeaters that provide weather radar feeds from the National Weather Service (or from TV and radio stations). As the unsettled spring weather approaches us, it always pays to have an edge on Mother Nature. It's great to know just where those nasty storms are, and when to head for cover.

But what if you don't have a local weather radar feed available? Let's take a look at an alternative.

Enter WeatherBrief

It turns out that a computer dial-up service called WeatherBrief is available from a company called WeatherBank, Inc. The WeatherBrief service gets its information from the National Weather Service and supplies it to their customers in a readily usable form.

Other, similar services that I've investigated have cost incredible amounts of money for the initial software package along with an exorbitant connect time charge. They were really geared up for commercial forecasters. Fortunately, WeatherBrief came along to give the average home user forecasting capabilities that only your TV weatherman had in the past.

What makes WeatherBrief so unique is its really inexpensive software package (only $49) and very reasonable connection charge (as low as 20 cents/minute). In fact, some free connect time is included with the software price, making this a real bargain! They also have a toll-free dial-up number, but you'll pay more for the connect time (35 to 43 cents/minute depending on the time of day).

The WeatherBrief package gives you the ability to view all kinds of nicely done custom graphic weather maps for various regions of the country. This package runs on just about any IBM PC or compatible clone with an EGA or VGA graphics card.

One of the nicest things about the program is the ability to select just those items you want to look at. The program is designed to log onto the main number, grab the information you're looking for in the shortest possible connect time, and log you off. Once the information is in your computer, you're free to view the weather maps and save them to disk (PCX graphics format). Since all of the high-res color maps are already part of your program, only the weather data is transmitted over the phone lines, saving tremendous amounts of connect time. These are high-quality maps your local TV weatherman would be proud to display on the evening news! You'll have a great time showing off your very own weather forecasting station on ATV.

Available Maps

All kinds of weather maps can be brought up. Weather front information (both regional or national), cloud cover, jet stream location, real-time lightning strikes, precipitation (current or forecasted) as well as actual satellite images for three areas of the U.S., are also accessible.

Download time is quite fast, typically about 10 to 30 seconds at 2400 baud for each item selected. For example, I selected a weather front map, precipitation forecast, weather radar, and a lightning stike sequence. I received all these in under two minutes. Quite a bit of information for 40 cents of connect time. This quick download capability is

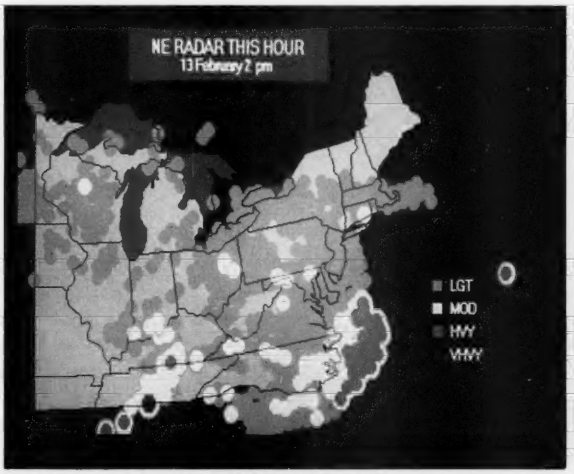

Photo A. Radar map of the northeast.

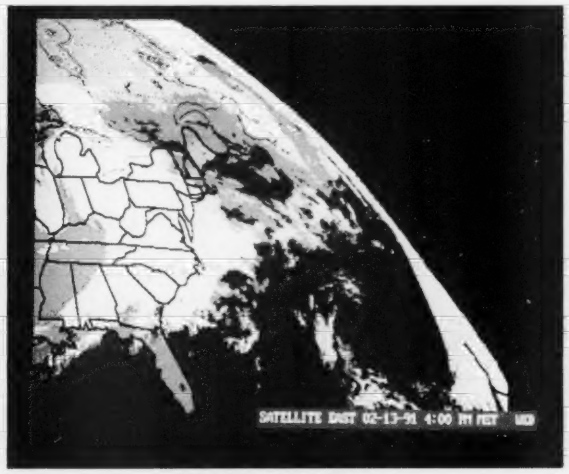

Photo C. Weather satellite map.

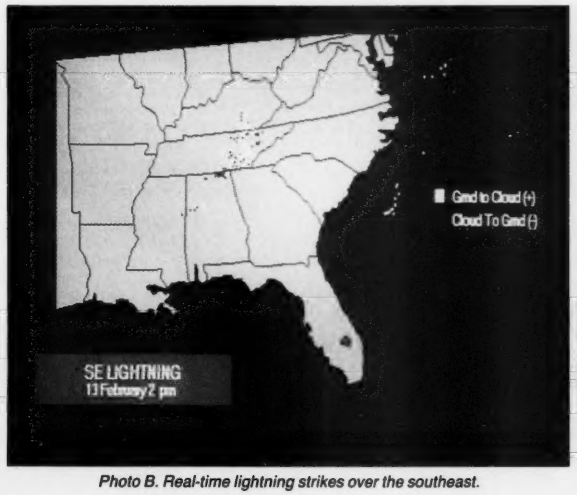

Photo B. Real-time lightning strikes over the southeast.

Photo D. Map of the jet stream.

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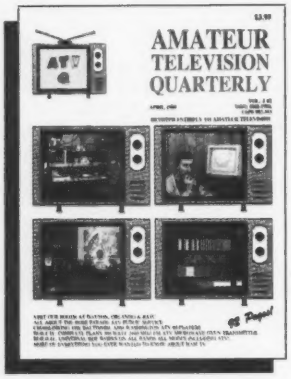

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due to the fact that the map graphics are already stored in your computer as part of the WeatherBrief software. Only the actual weather data needs to be retrieved. The only files which take a lot of time to download are the satellite images. These files are 30k plus in size and take about two to three minutes to download at 2400 baud. Also any custom map not already in your package can take some time as well. You can use a 1200 baud modem; it'll just take longer to download the information.

Once the information is in memory and you're offline, you can display the maps individually or in a continuous loop sequence.

One thing to note, however, is that these maps are divided up into either national or multi-state, regional coverage (not individual states or counties). Don't expect the weather radar screen resolution to equal that of a local weather radar feed. The resolution on the WeatherBrief maps is usually a 20 by 20 mile area. Their new version 4.0 does have the option of a single state map with 1 mile by 1 mile resolution. However there is a per month surcharge if you use this service.

ATV Uses

What can you do with this on ATV? Become your group's ATV weatherman! Know when weather trouble spots are approaching. Look at the weather radar map and real-time lightning strikes for your area, let your friends know when to unplug their antennas!

You can set up the latest version (4.0) of WeatherBrief to automatically dial-up for information periodically and display the results in a loop sequence. This would be a nice addition to any ATV repeater system. Set up a PC at the repeater site and let your whole group tune into the current weather.

Since certain weather patterns can be responsible for enhancement of UHF band conditions, try your hand at predicting the really big band openings! Hint: A clear, still and humid summer night in the Midwest with a big high pressure area stuck overhead is usually a winner.

For those of you really serious about studying temperature inversions, WeatherBrief allows you to access atmospheric sounding data from radiosonde flights nationwide. You can see the altitude and strength of the inversion just by reading this data. Also winds aloft forecasts and current wind profiles at various altitudes are obtainable in text format as well.

Where to Get It

If you can't find WeatherBrief at your local computer store, try calling Software Toolworks at (415) 883-3000, ext. 779. You can also order it from WeatherBank, Inc., 5 Triad Center, Suite 315, Salt Lake City UT 84180 or call (801) 530-3181. 73

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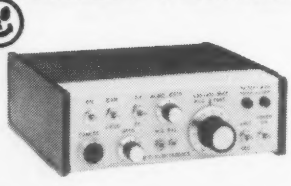

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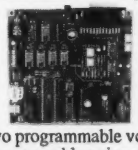

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Current DX News

According to Karl PS7KM, the Natal DX Group will activate St. Peter and St. Paul Rocks in May 1991. The list of operators includes PS7KM, PT7AA, PY5AKW, PS7AB and DJ9ZB. Karl notes that the cost of the DXpedition will be $11,000.

Next item: *DX Around the World*, edited by Larry Cox WA6AIL, is a Braille reference manual available from San Diego Braille Transcribers Guild, Inc., 1807 Upas St., San Diego CA 92103. The 55-page manual lists the current DXCC countries by prefix and name, compass headings, distance, time differences, zones, etc. Sunspot cycles and the Solar Index are also discussed. The cost of the manual (for materials only) is $4.15 (on paper) or $7.40 (on plastic pages). Thanks, "Long Skip."

Special Canadian Prefixes. In March and April, to commemorate the 100th anniversary of Ukrainian settlements in Canada, the following prefixes may be used by Canadian amateurs: VA1-8 in VE1-8 call areas; VC1 and VC2 in VY1 and VY2; VC9 in VY9; and VO7 and VO8 in VO1 and VO2. Note: The VY9 prefix is allocated for use by the Canadian Department of Communications.

Additionally, special event station VA100U will be active during this period on 10–80 meter CW and SSB (possibly some 160 meter activity too); 2 meter CW/SSB or FM upon request. QSLs for VA100U go to VE3IPR. Thanks VE3IPR, editor of "Long Skip."

DXing in 1990: A Brief Review

There should be no doubt that 1990 was a great year for DX. Some very rare countries, that had not been active for several years, were activated; several new DXCC countries were created; and conditions were generally quite good. There were a few disappointments, too, such as the DXpedition to South Georgia and South Sandwich Islands, which was postponed, and no DX from Albania. Perhaps this year. . . .

Bouvet Island. The year began with a bang with the 3Y5X DXpedition to Bouvet Island, one of the rarest DX countries. 3Y5X was operated by LA1EE, LA2GV, F2CW, JF1IST and HB9AHL to the tune of more than 45,000 contacts (42.2% with stations in the U.S.).

Bangladesh. JA1UT, JA3UB and others ended Bangladesh's radio silence by operating as S21U.

Bhutan. Jim VK9NS, after several years of negotiations with the Bhutanese government, put Bhutan back on the air, making almost 15,000 contacts. He signed A51JS. He is planning to return to Bhutan during 1991 (probably in May). Other operations, promised for 1990 by other operators, never happened.

Southern Sudan. John PA3CXC led a group of operators to Southern Sudan and operated as PA3CXC/ST0. The operators were John, PA3DFT, PA3CWM, DJ9ZB and IK1HJS.

Spratly Islands. A group of Soviet operators, led by Romeo UB5JRR (and 3W3RR), activated the islands during April as 1S0XV, and one or two other callsigns. The Spratly operators were later active as 3W1PZ, 3W6PY, 3W9CZ and 3W100HCM. Romeo postponed another trip to the Spratlys in order to activate Afghanistan (YA0RR during January 1991).

Yemen. 9K2CS and several other operators from Kuwait operated from the newly proclaimed Yemeni Republic as 7O1AA, the first legitimate operation in many years. 9K2CS, the QSL manager for this operation, is now living in Saudi Arabia, but the logs are thought to still be in Kuwait. The new Yemeni Republic was the result of a merger between North and South Yemen (4W and 7O) on May 22, 1990. The ARRL officially deleted the two former DXCC countries of Yemen from the DXCC countries list and added the Yemeni Republic (a two-for-one swap). A second operation from Yemen during late July/early August by J28AA, F6EXV and F2VX, was signed 7O8AA.

Malawi. Operators in Malawi returned to the air after many years of silence. For some years, only Les 7Q7LS was allowed on the air, and he went QRT several years ago. It was great to hear numerous 7Q7 stations on the air again. It was especially nice to hear Ron 7Q7RM who signed ZD6RM back in the '50s when the country was called Nyasaland. Times change.

Mozambique. Lloyd and Iris, W6KG and W6QL respectively, did it again and obtained permission to operate. They signed C9QL for several weeks. There had been no legitimate activity since the two-days-per-month activity by C9MKT several years ago.

Malpelo Island. A group of operators from Colombia once again operated from this rock with the callsign HK0TU. It was a very successful operation. QSL via HK3DDD.

Germany. Effective October 3, 1990, the German Democratic Republic (Y2–Y9) was deleted from the DXCC countries list after it was absorbed by the Federal Republic of Germany (DL, DK, etc.).

San Felix Islands. Beginning in late 1990, John CE0ZAM began his operation from San Ambrosio Island as XQ/0X, a very welcome operation.

Mount Athos. SV2RE/A and SV2UA/A removed Mount Athos from a large number of need lists. They were there to train Monk Apollo SV2ASP/A.

DXCC Activities. During 1990, the ARRL received several applications for separate country status. Other applications were processed by the DXAC and Awards Committee.

Walvis Bay. (ZS9) became a new DXCC country. Grosse-Ile (CI0GI) and the Puyallup Tribe of Indians (K7SS/PTI) were not approved for separate country status.

[Editor's Note: According to Terry Robinson VK3DWZ, Mr. Barry Wilton of the Victorian Division of the Wireless Institute of Victoria informed him that a QSL bureau for incoming cards no longer exists in the State of Victoria, Australia. Please do not send any cards to VK3 via the bureau.

Next, Douglas A. Donley, KG4 QSL bureau manager, says that QSLs will no longer be forwarded to people no longer residing in Guantanamo Bay. This is because people do not keep their addresses updated at the bureau. For more information, including a list of callsigns you can currently QSL via the bureau, send an SASE to Doug Donley KB4DD, Box 692, F.P.O., New York NY 09593-0055. Remember, only KG 2X2 calls are in Guantanamo Bay.]

Random Output

Continued from page 96

worked great. I finally made a "real" vertical dipole out of a 19" piece of a mobile whip and copper tubing. It hung off of the curtain rod in our living room for over a year. I used the rest of the coat hanger (from the original vertical dipole) to build a basic quarter-wave ground plane. I tacked it up on the ceiling above my bedroom operating desk. Now I could work 2m from both rooms. Being on the second floor gave me enough height to make it into a local packet node, so I was on packet, too!

Determined to be a multiband operator (what good is a General Class license if you can't gloat to your Technician friends about all the great DX on 20 meters?), my antenna construction went into high gear. I wrapped the entire apartment in a twisting longwire so I could work 80m during Field Day. My wife put up with that for the duration of the contest, and I made a few 80m QSOs, but it was impractical for permanent installation.

I wrapped a multiband folded dipole around the bedroom ceiling. It was made entirely out of 300 ohm twinlead. . . and it didn't work.

I spent all afternoon wrapping wire around an 8-foot pole, contructing my own helically-wound vertical. I wrapped about 130 feet of wire and attached 12" of whip to the top. Unfortunately, living on the second floor didn't make for the best grounding system. I cut counterpoise wires for every band and wrapped them around the base of the room. (As far as I know, the counterpoise wires are still hiding under the rug in that bedroom. It was too much of a hassle to dig them up when we moved, so I just left them.) Reception was pretty good, but I couldn't touch anything that even looked like metal without receiving a jolt that sent my heart into overdrive.

I finally decided that a loop was the way to go. I wrapped the room with a horizontal loop, fed it into my antenna tuner, and fired up. The antenna loaded fine. So did the TV, the telephone, the microwave, the stereo, the toaster oven, the blender, and the landlord's cat. I think maybe the ground controllers at the New Haven airport also had a few unkind words.

Still holding out for a loop, I strung a 10m, full-wave loop vertically around the bedroom window. With a jumper wire at the top, it also gave me a dipole on 20. I fed it with 400 ohm ladder line into my tuner. 10 meters. . . . no problem. 15m. . . Hey, I just worked four countries in Western Europe, and that's a Venezuelan calling me! This is great! 20m. . . "You're a little weak, old man, but I copy 100%." I'll accept that. 40m. . . SWR a bit high, but 5 and 9 reports all over the Eastern Seaboard.

That little loop stayed up for the rest of our time in that apartment. It caused terrible TVI on any band but 10m, so I had to self-monitor my operating times so as not to bother the neighbors. . . or the landlord. I worked close to one hundred countries on that indoor loop, including a few semi-rare ones pulled out of pile-ups. Even in the middle of a busy pile-up, I would always mention the indoor loop, and the DX amateurs would always stop the "5 and 9, QRZ" stream to ask a question about it or compliment my determination. A few of them even mentioned it on their QSL cards.

Now that we live in the country, I finally have a few normal dipoles strung up in the trees at a respectable height (though it cost me about 2,000 mosquito bites to get them up). I get a pretty good signal out on every band except 80m and 160m. . . and I do OK on 80m if the wind is right, if there's ice on the antenna, and if I'm careful with the antenna tuner. I can work Europe, Asia, South America and Africa any time the band is open. I'm not a "Big Gun" on any band, but if I hear it—and there's not an incredible pile-up—I can work it. I have my own radio room, so my wife doesn't have to put up with a wall of wires in the bedroom anymore.

I've been thinking about stringing up a LONG longwire—like a couple a' thousand feet—now that the warm weather is here. We've got the land, and I could spend all summer experimenting, adding a few hundred feet every weekend, but it's hard to get motivated when you're already doing fine with what you've got up.

I miss my indoor loop.

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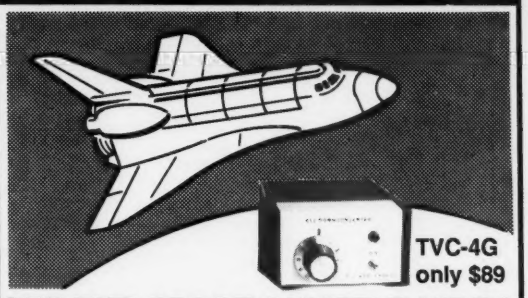

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RANDOM OUTPUT

David Cassidy N1GPH

Some Weird Antennas I Have Known

Ah . . . spring . . . when a young ham's fancy turns to antennas. You folks in southern climes have no idea what it feels like to live through a long, cold winter—watching the ice build up and strain your antennas, knowing that it will be several months before you can repair any damage. When the mercury starts climbing again, the ice on the lakes is all but gone, and the only snow left is the stuff that lingers in the shadows under the pine trees, we in the North can't wait to get out the ladder, slingshot, climbing belt, bow and arrow, and fishing line, and start stringing copper wire. The local hardware store quickly runs out of aluminum tubing, as the sweet sound of hacksaw blades cutting into metal can be heard.

As the spring antenna bug bites once again, I got to thinking of all of the antennas I have tried. We tend to associate the passage of time with certain things—popular songs, political events, the birth of children. I guess a ham marks the passage of time with the different antennas he has used.

The first time I put my own callsign out on the air, I was operating an HW-16 into a 15m dipole. That in itself wasn't so unusual . . . until you got a look at the dipole! It was made out of a spool of solid 24 gauge wire, bought at Radio Shack for about $1.49. Its insulation was bright red. It was fed with about 6 feet of RG-58 coax, and it was about three feet off the ground. It came straight out of my first floor bedroom window and was tied off to a fencepost on one leg, and to the branch of a bush on the other. I ran in and out of the house, trimming one-quarter inches, until I hacked off too much. Then, of course, I started adding pieces until I got a respectable SWR. My mother let me keep that antenna up for quite a while, bless her. My dad had to duck under it to mow the lawn. I didn't work any DX with that antenna, but I did work as far away as Texas. I was ecstatic!

A year or so later, my dad got his ticket. You have to understand something about the men in my family—we don't do anything halfway, especially when it involves gadgets, gizmos and anything that requires electricity to operate. Just ask my mom, my wife, or any of my sisters-in-law. The Cassidy boys just can't resist anything with a panel meter or an LCD on it. Needless to say, my dad quickly took to amateur radio.

One of the bedrooms became the radio room. An HW-101 and all of the matching accessories took their places on a custom-built desk. Upon the swift and inevitable upgrade to General Class, the various dipoles strung at the proper height off the peak of the roof were joined by a rooftop tripod tower and a triband beam. After a while, a compiete Kenwood station replaced the homemade Heathkit stuff. It was a high school ham's dream: A beautiful, state-of-the-art station. How many members of my high school radio club could even compare their stations to this monument to global communications? And . . . it hadn't cost me a dime. Dear ol' Dad had provided everything. All I had to do was sit down and power up.

Wrong!

I never got closer than the kitchen to that dream station. Dad chased counties. He chased DX. He chased me right out of the operator's chair! Oh, sure, I snuck in a few QSOs after school, before he got home from work, but Dad took the unbelievably shortsighted attitude that he should actually be able to use all the stuff he bought, built and paid for.

During and after college, I was more concerned with partying (during) and paying bills (after) than amateur radio. It wasn't until after I was married that I was re-bitten by the radio bug. It's then that my antenna building became an obsession.

Dad's old HW-101 was still sitting around, so a rig was no problem. Putting up an antenna was a definite problem. We were living in a one-bedroom, second floor apartment in Connecticut. The first floor of the building was a busy florist/garden center, with a parking lot all around. All of our windows looked out over a busy street, so hanging a wire out the window was out of the question. At this point, my antennas started becoming weird.

First, I wrapped dipoles around the bedroom. That was OK on 10m during the peak of the sunspot cycle, but I wasn't getting out on any other band. Next, I tacked up a random length of very thin wire outside the bedroom window, along the front of the building. Aha! An outside antenna . . . and the landlord couldn't even see it. With my wife holding onto my legs so I wouldn't fall out of the window, I stretched every inch I could out of that wire. I ran back to the rig, fired up the HW-101, and started turning knobs on the antenna tuner. I got a beautifully flat SWR on 10m, but couldn't get any other band to tune up.

Working the local 2m repeaters was easy, even with 5 watts and an HT. I threw together a twin-lead J-pole, which worked but the SWR was too high. I taped a horizontal dipole to the window. Being on the second floor and close to several repeaters, it worked OK but looked kinda' strange. I finally decided that a vertical dipole was the answer. The first one used a piece of coat hanger for the top. The bottom half was a cardboard tube wrapped in tinfoil. It looked like something out of a 1950s science fiction movie, but it

Continued on page 92

PROPAGATION

Jim Gray W1XU

Jim Gray W1XU
210 E. Chateau Circle
Payson AZ 85541

First Two Weeks Best

April ought to provide some excellent DX for your logs. However, looking at the table, you can see that the first couple of weeks will be better than the last couple of weeks. Overall, there will be good and fair days intermixed in a generally poor outlook for each week.

April has traditionally been a good month for propagation on the HF bands. Once again, you will find the 20 through 10 meter bands open from shortly after dawn to shortly after dusk on many days of the month.

Last month we talked a bit about using the charts with WWV announcements to plan your DX efforts. Here's the way I work them: First, I look on the daily chart for those days marked "Good," and verify the forecast by monitoring WWV at 18 minutes after any hour for trends in conditions.

Second, I use the band-time-direction chart to find the most likely times that the HF bands will be open to a specific area of the world. As you can see, some areas are open on some bands and not others, and during a specific time. I choose the band most likely to be open in an area, and listen slightly before, during, and after the times indicated. Sometimes a higher frequency band will open up sooner than expected.

If you like the WARC bands, as I do, then look at the chart for 15 meter conditions and expect similar conditions on 17 meters. Sometimes the 10 meter band will be a better indicator of conditions on 12 meters, but also check 15 meters to see what's coming through. Thirty meters is an evening and early morning band for DX, and a short-skip band during the daylight hours.

In April, my best guess is that between the 20th and 25th, you might do better to take up another hobby temporarily, as the bands should be extremely poor . . . but there's always a chance that the forecast will be wrong, so check the bands anyway! See you next month, and happy DXing. 73

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA	10	—	20	—	—	—	20	20	—	—	15	10/15
ARGENTINA	15	10/15	20	40	40	—	—	10	—	—	10/15	10/15
AUSTRALIA	10/15	20	20	20	20	40	20/40	20	—	—	—	10/15
CANAL ZONE	15	20/40	20/40	20/40	20/40	15	15	10	10	10	20	10
ENGLAND	20	40	40/80	40/80	40	—	—	15	10	15	15	20
HAWAII	10/15	15	20	20	20/40	20/40	20	20	—	—	—	10/15
INDIA	20	20	—	—	—	—	—	15	—	—	—	—
JAPAN	10	—	20	—	—	—	20	20	—	—	15	10/15
MEXICO	15	20/40	20/40	20/40	20/40	15	15	10	10	10	20	10
PHILIPPINES	15	—	20	20	—	—	20	10/15	10	—	—	15
PUERTO RICO	15	20/40	20/40	20/40	20/40	15	15	10	10	10	20	10
SOUTH AFRICA	20/40	40	20	20	—	—	—	—	10	10	15	15
U.S.S.R.	40	40/80	20	20	—	—	—	10/15	10/15	—	20	20
WEST COAST	20/40	20/40	20/40	40	40	—	—	10/15	10/15	10/15	10/15	20

CENTRAL UNITED STATES TO:

ALASKA	10/15	15	20	20	20	—	20[m]	20[m]	—	—	—	10/15
ARGENTINA	15	15	20/40	20/40	20	—	—	10	—	—	10	10/15
AUSTRALIA	10/15	15	15	—	20	20/40	40	20[m]	—	—	15[m]	10
CANAL ZONE	15/20	15/20	20/40	20/40	20/40	—	—	10/20	10/20	10	10	10
ENGLAND	40[m]	40/80	40	—	—	—	—	15[m]	15[m]	20	20	20
HAWAII	15	15	15	20	20	20/40	40	20	—	10	10	10
INDIA	15[m]	10[m]	—	—	—	—	—	10/20	15[m]	—	—	—
JAPAN	10/15	15	20	20	20	—	20[m]	20[m]	—	—	—	10/15
MEXICO	15/20	15/20	20/40	20/40	20/40	—	—	10/20	10/20	10	10	10
PHILIPPINES	10/15	—	20	20	—	—	—	10/15	10/15	—	—	—
PUERTO RICO	15/20	15/20	20/40	20/40	20/40	—	—	10/20	10/20	10	10	10
SOUTH AFRICA	—	—	20	20	—	—	—	15	15	15[m]	20	20
U.S.S.R.	—	—	—	—	—	—	—	15[m]	15[m]	15[m]	20	20

WESTERN UNITED STATES TO:

ALASKA	10/15	10/15	15	20	20	20	—	20	20	—	—	15
ARGENTINA	10/15	15	15	20	20	—	—	—	—	—	10	10
AUSTRALIA	10	10/15	15	15	20	20	20	—	20	—	—	—
CANAL ZONE	10	15	15/40	20/40	20/40[m]	—	—	—	10	10	10	10
ENGLAND	20	20	—	—	—	—	—	—	15	15	15/20	20
HAWAII	10/15	10/15	15	15/20	20/40	20/40	40	—	15	10	—	—
INDIA	—	15[m]	20	—	—	—	—	—	10[m]	15[m]	—	—
JAPAN	10/15	10/15	15	20	20	20	—	—	20	—	—	15
MEXICO	10	15	15/40	20/40	20/40[m]	[m]	—	—	10	10	10	10
PHILIPPINES	10	10	—	—	—	—	—	20	15	15/20	—	—
PUERTO RICO	10	15	15/40	20/40	20/40[m]	[m]	—	—	10	10	10	10
SOUTH AFRICA	20	20	—	20	—	—	—	—	—	—	10	15
U.S.S.R.	20	—	—	—	20[m]	—	—	20[m]	20[m]	20	20	20
EAST COAST	20/40	20/40	20/40	40	40	—	—	10/15	10/15	10/15	10/15	20

* Try next higher band on "G" days. (1) Possible opening on this band on "G" days. (2) Try 80m.
Note A: Use values of 10/15 for 12m; 20 for 17m; 40 for 30m. Note B: This chart refers to the highest band possible at the time indicated. If no luck, try next lower band.

APRIL 1991

SUN	MON	TUE	WED	THU	FRI	SAT
	1 G-F	2 F-P	3 P	4 P-F	5 F	6 F-G
7 G	8 G	9 G	10 G	11 G	12 G-F	13 F-P
14 P	15 P	16 P-F	17 P-F	18 F	19 F	20 F-P
21 P	22 P	23 P	24 P	25 P-F	26 F-G	27 G
28 G	29 G	30 G				

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Compact FM Handhelds

The lightweight and compact FT-411E offers superb operating convenience and an incredible array of features. Such as.

- 49 Memories
- 2 Independent VFOs
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- Built-in VOX
- 10 Battery Saving Sampling Rates
- PTT/Keypad Lock
- Includes: CSC-35 Vinyl Case, NC-28B 117 VAC Wall Charger, Belt Clip and FNB-17 Ni-Cad Battery.
- Accessories/Options: FNB-12S (5 Watts) Battery, MH-12A2B Speaker/Mic, MH-19A2B Mini Earpiece/Mic, MH-18A2B Lapel Speaker and LCC-25 Custom Leather Case.

Specifications

Frequency Range: RX: 130–174 MHz, TX: 144–148MHz (FT-411E); 430–450 MHz (FT-811); 1240–1300 MHz (FT-911)

Power Output: W/FNB-17: 2.5 Watts (FT-411E); 2.0 Watts (FT-811); 1.0 Watt (FT-911) — W/FNB-12S: 5.0 Watts (FT-411E); 5.0 Watts (FT-811); 1.0 Watt (FT-911)

Channel Steps: 5, 10, 12.5, 20 & 25 kHz

Case Size: 2.2 (W) x 5.0 (H) x 1.3 (D) in.

Weight (Approx.): 13.4 oz. (FT-411E); 13.4 oz. (FT-811); 15.2 oz. (FT-911)

FT-470

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Compact. . . Powerful. . . Economically Priced. The FT-470 provides "true" Dual Band Operation so you can transmit on one band while monitoring or scanning on the other band.

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- 10 Memory Auto-Dialer
- 10 Battery Saving Sampling Rates
- PTT/Keypad Lock
- Includes: CSC-43 Vinyl Case, NC-28B 117 VAC Wall Charger, Belt Clip and FNB-17 Ni-Cad Battery.
- Accessories/Options: FNB-12S (5 Watts) Battery, MH-12A2B Speaker/Mic, MH-19A2B Mini Earpiece/Mic, MH-18A2B Label Speaker and LCC-27 Custom Leather Case.

Specifications

Frequency Range: RX: 130–180 MHz, TX: 144–148 MHz (VHF); 430–450 MHz (UHF)

Power Output: W/FNB-17: 2.3 Watts (144 & 430 MHz) — W/FNB-12s: 5.0 Watts (144 & 430 MHz)

Channel Steps: 5, 10, 12.5, 20 & 25 kHz

Case Size: 2.2 (W) x 6.0 (H) x 1.3 (D) in.

Weight (Approx.): 14.8 oz.

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Specifications guaranteed only within amateur bands.

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TH-27A/47A

2 m and 70 cm Super Compact HTs

Here is a great new addition to Kenwood's HT family – the all new TH-27A for 2 meters and TH-47A for 70 cm! Super compact and beautifully designed, these pocket-sized twins give you full-size performance.

- **Large capacity NiCd battery pack supplied.** The standard battery pack is 7.2 volts, 700 mAh, providing extended transmit time with 2.5 watts. (TH-47A: 1.5 W.)
- **Extended receive coverage.** TH-27A: 118–165 MHz; TH-47A: 438-449,995 MHz. TX on Amateur bands only, (TH-27A modifiable for MARS/CAP. Permits required. Specifications guaranteed for Amateur bands only.)
- **Multi-function scanning.** Band and memory channels can be scanned, with time operated or carrier operated scan stop.
- **Frequency step selectable for quick QSY.** Choose from 5, 10, 12.5, 15, 20, or 25 kHz steps.
- **Built-in digital clock** with programmable timer.
- **Dual Tone Squelch System (DTSS).** Compatible with the TH-26AT Series and the TM-941A Triple bander, as well as other Kenwood series transceivers, this selective calling system uses standard DTMF to open squelch.
- **Five watts output** when operated with PB-14 battery pack or 13.8 volts.
- **T-Alert for quiet monitoring.** Tone Alert beeps when squelch is opened.
- **Auto battery saver, auto power off function, and economy power mode extends battery life.**
- **DTMF memory.** The DTMF memory function can be used as an auto-dialer. All characters from the 16-key pad can be stored, allowing repeater control codes to be stored!

- **41 memories.** All channels store receive and transmit separately for "odd split."
- **DC direct in operation.** Allows external DC to be used (7.2 – 16 volts). When external power is used, the batteries are being charged. (PB-13 only.)

- **Automatic offset selection (TH-27A).**
- **Direct keyboard frequency entry.** The rotary dial can also be used to select memory, frequency, frequency step, CTCSS, and scan direction.
- **CTCSS encode/decode built-in.**
- **Supplied accessories:** Rubber flex antenna, battery pack, wall charger, belt hook, wrist strap, dust caps.

Optional accessories:
• **BC-14:** Wall charger for PB-13 • **BC-15:** Rapid charger for PB-13, 14 • **BC-16:** Wall charger for PB-14 • **BH-6:** Swivel mount • **BT-8:** Six cell AA Alkaline battery case • **HMC-2:** Headset with VOX and PTT • **PB-13:** 7.2 V, 700 mAh NiCd pack • **PB-14:** 12 V, 300 mAh NiCd pack • **PG-3F:** DC cable with filter and cigarette lighter plug • **PG-2W:** DC cable • **SC-31:** Soft case • **SMC-31:** Standard speaker mic • **SMC-32:** Compact speaker mic • **SMC-33:** Compact speaker mic with controls • **WR-2:** Water resistant bag.

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Complete service manuals are available for all Kenwood transceivers and most accessories.